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THE HIGHLANDS OF THE GREAT CRATERS, TANGANYIKA TERRITORY

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THE *Hochland der Riesenkrater*, in what was formerly German East Africa, west of Kilimanjaro, has been described and roughly mapped by various German travellers, from Dr. Oscar Baumann—the first white man to strike out a route across this part of the *Abflusslosgebiet*—to Dr. Fritz Jaeger, whose more detailed researches were described in the elaborate monograph bearing the title since generally bestowed on the remarkable region therein dealt with. But I do not know any account of it in English, and therefore at the suggestion of Sir Harry Johnston I took advantage of an opportunity to pay it a brief visit in the early months of this year, and send the following account of my visit.

This district, a part of which was also known to the Germans as the *Winter Hochland*, is called Engotiek by the natives inhabiting the Arusha district and is now called on British maps the Highlands of the Great Craters, or the Engotiek Plateau.

The region is not easy of access to the ordinary traveller, for it lies away from all the main caravan routes, being surrounded by waterless tracts to the north and west, and enclosed to the south, east, and north-east by extensive lakes and active craters. Within the Ngorongoro crater itself two farms had been granted to a family named Siedentopf, all the male members of which were very active participants in the late war, and it was Herr Siedentopf senior that kept the German soldiers supplied with meat rations at a critical time by shooting wildebeeste in Ngorongoro. As the crater itself is said to contain 50,000 of these animals, which never leave it, the task was fairly easy, and he could, if necessary, have supplied the army with meat for a very long time; in fact, the Germans contemplated erecting a canning factory within the crater for this purpose.

In the second week of February 1921 our party met at Voi and took the one train to Moshi, the junction of the Voi military railway with the late German Tanga–Moshi line. There is very good shooting close at hand, but especially round lake Jipe, where that shy gazelle, the long-necked Gerenuk, may be met with, and in the Pare Mountains the giant Abbot's Duiker.

Three cars just managed to land us and a few personal belongings in Arusha without any serious breakdown; the rest of our gear followed with porters. *En route* a young Abbot's Duiker was brought us, but, perhaps owing to the joggling of the car or being hurt in some way, it unfortunately died before we reached Arusha. The road is being put in order, and substantial bridges built: it gradually ascends to the rich highlands of the Meru mountain. All visitors to Arusha fall in love with the place, and judging by the extremely fertile volcanic soil and the luxuriant growth of tropical and sub-tropical trees and plants, from peaches, bananas, and coffee down to wheat and potatoes, this part of the district at any rate will go ahead, and is also likely to become, so I am told, the Government hill-station at some future date. Unfortunately the Arusha district is very limited in extent. As I passed through, it struck me that tea should do well here; the rich red soil and the copious rainfall well distributed throughout the year should suit this plant admirably. However, most of the plantations and farms are at present held by Dutchmen and Greeks, who I judge are lacking in enterprise, so if tea is to be tried, and it is well worth while, the Government will have to do it.

One hundred and fifty porters were waiting for us at Arusha, recruited from the village of the agricultural Masai, who now inhabit the slopes of Meru. They proved to be a pleasant lot of savages and never grumbled, although they must have been hard put to it at times not to do so, especially when nights were cold and rainy, and they had to sleep out in it as best they could.

The Highlands of the Great Craters are some 75 miles west of Arusha, and the region is administered by the Political Officer at this place. Reports of the great concourse of animals within the Ngorongoro crater and its wonderful scenery greatly pleased us, as did the news that lions were abundant and commonly seen in the daytime; also that the rhino carried exceptionally fine horns, and, as Major Brown the D.P.O. put it, "might well be classed as vermin."

We now learned that the district is inhabited only by the nomadic pastoral Masai, who never cultivate a grain of anything, so we had to arrange for a supply of food for our large safari to reach us from time to time. Major Brown kindly sent instructions to Mbulu, a Government post 60 odd miles to the south of the craters, that we were to receive a good quantity of native meal by special porters at a main camp we proposed to make within the central crater of Ngorongoro.

With the able help of our Somali headman Ahamet, all the loads were presently adjusted, and one forenoon saw our caravan file out of the shady roads of Arusha into the torrid acacia-strewn plains below. For three days we trekked across an arid steppe, finding water fairly plentiful at this time of the year, although muddy with the heavy rains we encountered. Game was abundant, and we saw a few Schilling's giraffe, also many of those splendid game birds the giant bustard or pau, a nest

of which our table boy discovered, with two light blue and brown splotched eggs in it.

The fourth day brought us to the Mbújuni river, which, rising in the Essimingor mountains, runs due south across the Mbugwe road and not northerly, as shown on the Kilimanjaro sheet B5 of the 1/300,000 map. Hence we skirted Essimingor, and marching parallel with the shore of lake Manyara, although still some distance from it, we reached a Masai encampment and pitched our tents near the only available water, which lay in a muddy depression on the Manyara flats, and which had been churned up with the hoofs of zebra and many cattle. The zebra seemed to like the company of human beings, for they would not leave our vicinity. The Masai never kill or eat the game about them, and in consequence the latter show no fear of man—in fact, I think the game near our camp looked upon us as a kind of protection from the lions, which are very numerous on this side of the lake.

As we rounded the spurs of Essimingor and dropped down the low escarpment of the eastern Rift Valley to this camp on the grass flats of Manyara, we obtained our first uninterrupted view of the great wall on the far side, running north and south across the landscape, upon which, to our right, towered the massive summit of Loolmalasin, the highest peak of the plateau. The natives with me immediately pointed to the escarpment before us and exclaimed, "Engotiek," which is the name commonly used amongst them for the Highlands of the Great Craters. Looking to the north along the western wall of the Rift Valley, which so much resembles the Western Rift along which I had journeyed not so many months ago, the sharply cut outlines of the Oldonyo-Lengai volcano stood out darkly against the sky-line some 50 miles away. Again looking to the south, across the thin silver streak of lake Manyara, were to be seen the steep buttresses that round off the Irok or Iraku (as the map has it) portion of the plateau, known as the Wambulu country.

We were glad enough to move off next morning away from the filthy water and intolerable cloud of flies of this camping-place, round the north end of Manyara to the Dathyieni river,* a fairly big stream of clear water running between cool and forest-clad banks, and having several sources above and on the face of the escarpment. The way took us first across a long stretch of open plain covered with sage bush, interspersed with belts of thorn scrub, and then, as we neared the ancient shore-line of the lake, over the most curious petrified volcanic mud formation I ever remember to have seen, resembling gigantic flattened cobble-stones, across which it was difficult to walk. These cobbles decreased in size until the old shore itself was reached, where they were loosely piled one on top of another,

* This river is wrongly named on sheet Eyassi B4 as Olgedju-Rongai. Neither the local Masai nor our porters knew it by this name. The river is also wrongly placed, as it flows into Lake Manyara at its north-west corner, and not through the centre of the grey saline flats that lie across the north end of the lake.

resembling great balls of hardened grey mud, from the size of a large ostrich's egg down to pieces a few inches in diameter, all symmetrically corrugated in a wavy pattern. When one of these stones was hammered, the outer crust broke off in rounded layers of ever-increasing hardness, until a milky opaque core of flint was exposed.

As we passed the lake its shallowness, even far out, was easily discerned by the great quantity of flamingoes feeding across it, making a great splash of rosy reflection around them as they fed. There are two big lagoons north and south, and some water channels, but the rest of the lake-bed was in February dried saline mud and sand, grey and brown in colour.

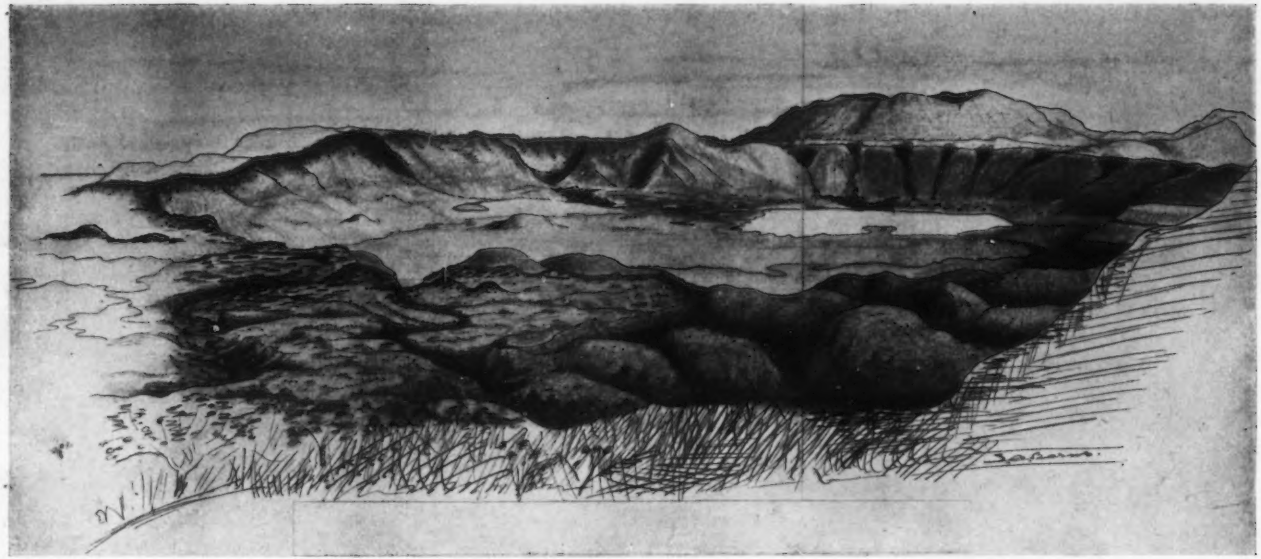
After a hot march of several hours we were glad to find a pleasant camping-place on the banks of the Dathyieni river, which runs almost at the foot of the sheer wall of cliffs now rising nearly 2000 feet above us, and in the shadow of which our tents lay. This camp was 3150 feet above sea-level. The following day we climbed the escarpment to reconnoitre. The view below us was superb, and we gained an idea of the formation of the floor of this part of the Rift Valley and recognized that it was divided up into a chain of basins of varying sizes, formed of such porous volcanic débris, and beaten upon by such a fierce sun, that some of them would scarcely hold water, and each divided from the next by what may be termed a low, and in some cases a narrow, dam. Lake Natron was one; the next southward was a small basin formed by the eruption of Oldonyo-Lengai in 1917; following this came the Engaruka Flats; then the big Manyara basin, and so farther to the narrow Babati lake beneath the Ufiome volcano. As we clambered down again to our camp we passed above a cleft in the face of the escarpment, where with a continuous roar a subterranean river leaps out into the Rift Valley—possibly the Munge river by which we camped the following day—its lower course is unknown, and its waters apparently become lost in some lake-bed or crater amid the primæval forest surrounding it.

Starting at dawn the following morning we all climbed the escarpment, having breakfast on its edge, where my aneroid showed an elevation of 4950 feet. We made a seven-hour trek that day, which took us first across open park lands, reminding me in all essentials of the Tanganyika–Nyasa plateau, and then, gradually ascending, on to undulating grass country with scattered thorn trees, until we reached the sharply defined belt of primæval forest clothing the eastern slopes of the Ngorongoro volcano and the Loolmalasin summit. It would appear that this dense and dank forest belt harbours neither many mammals nor any abundance of insects. Monkeys were absent, elephant tracks there were none. Rhinoceros, which are exceedingly numerous all over the great craters, only pass through it, and the giant forest hogs which roam this side of these highlands in great numbers, as also the bushbuck, prefer the forest glades which begin when the edge of the high central plateau is approached, at an elevation of about 7000 feet.

THE CRATER OF NGOROGORO FROM ITS EASTERN WALL: OLDEANI VOLCANO BEYOND

FLOOR OF THE CRATER OF NGORONGORO: WILDEBEESTE IN MIDDLE DISTANCE

THE CRATER OF NGORONGORO AND MAGAD LAKE FROM THE WESTERN WALL



THE CRATER OF NGORONGORO LOOKING SOUTH FROM OLOLMOTI: SKETCH BY MR. T. A. BARNS

We camped that night on a green circular lawn of grass surrounding a tiny pool, in the centre of a miniature crater, the most perfect spot that can well be imagined for a camp. The natives know it as Olbalbal Losaiyaie, and it lies close to the eastern bank of the Munge river, which could be heard rushing past in its bed of lava. The elevation being 5800 feet, we passed a cold night, and in the morning, everything being drenched with dew, we were glad to pass beyond the forest belt and reach the open glades above. These were the most beautiful I have ever seen. We had arrived between the two seasons of the little and big rains, when the flowers of both plants and trees were in blossom to perfection. The forest bordering these narrow glades had formed itself into high hedges and banks, which were brilliant with a species of yellow-flowered arborescent bean, that, although common on the heights of Kilimanjaro, Meru, Kenya, and the Great Craters, is seldom seen farther west either on Ruwenzori or the Mufumbiro mountains. Below this background of yellow flowers hung great bunches of purple Vernonia, and then came a wonderful carpet of white lilies, scabious, forget-me-nots, and everlasting flowers, between the greens of fennels and wild turnip; then lower still, midst the fine grasses and clovers, little erect-growing violets on long stalks, as if they too would aspire to arborescence.

Presently we stood on a ridge with the forest and its glades behind us, confronted by a splendid and what looked to be a circular treeless moor many miles across, and we knew that we had now reached the topmost plateau of this fascinating country, the far side of which bordered the vast chasm of the great Ngorongoro crater. This moor, which stands at an elevation of 7800 feet, presents many interesting problems to the vulcanologist, for it would appear to be the ancient floor of a giant crater, second only to Ngorongoro itself. From where we stood its northern and western circumference was bounded by the steep slopes of the Loolmalasin summit and the Ololmoti crater and their connecting ridge, and on the southern and eastern side by the ring of connected ridges and hills, bearing every resemblance to the ruins of a crater wall. In support of this supposition there were to be found in odd corners of this saucer-like plateau, the small craters or rather depressions so frequently met with on the floor of volcanoes of large size. On such a one, containing a pool of water, we camped for that night, after traversing a portion of the moor. We found its hummocky grass-covered surface very fatiguing to walk over, the hummocks being formed by uncountable generations of moles. This is the large grey mole (I forget its specific name) with the pair of long teeth that come out to meet the upper incisors from an aperture below the bottom lip; it is common all over Africa. In this friable volcanic soil there were millions of these moles; they are in fact to be found pushing up their chocolate-coloured hills all over the great craters. Their fur is of an exquisite quality and colour, so here there should be a unique opportunity for an enterprising trader willing to

foster such an industry as mole-catching amongst the younger generation of Masai.

Frequenting the large patches of fragrant lad's love bushes which cover many acres of the moor are numerous rhinoceros. We saw eland, hartebeeste, and other game, and many spoors of lions. Altogether we had a splendid and interesting day, and in spite of the long march we hardly felt tired in the rarefied air, a companion especially feeling the benefit of the high altitude as he had been gassed in the war.

The camp on the moor was astir at an early hour the following morning, for, owing to the proximity of Ngorongoro, which we were to reach that day, the spirit of expectancy had invaded it, causing us to tumble out of our flapping tents with but scant attention to the cold Scotch mist driving past outside.

Across our right front, as we followed our Masai guides over the tussocky turf and over the one sizeable stream that wanders through the centre of this Alpine moor, lies the imposing pile of the Ololmoti crater, its frowning brows forming what seems to be more a mountain range than a single volcano. On looking halfway along its face, a narrow breach in its ramparts is discernible, through which, after collecting its waters from the springs and pools of the inner crater, leaps the Lemunge river on its short but turbulent way to the lake lying in the mighty abyss of Ngorongoro, 4000 feet below.

We reached this running stream at a point not quite halfway down its length, where it leaves the edge of the moor and starts on its headlong course over the wall of cliffs. Here we crossed it, and, leaving the moorland behind, we entered a broken country, made on the one hand gloomy and weird with old, blackened, and matted primæval acacia forests, and on the other beautiful with an extraordinary wealth of flowers and flowering shrubs. Passing through this unique scenery and out beyond the last belt of dark forest, the enchanted traveller finds himself standing on a great eminence—an edge of the world—from which he gazes down into a chasm so vast and presenting such novel features, that his breath is taken away at the sight.

An unbroken ring of precipitous cliffs circled away on either hand, to meet in the blue haze 12 miles across from where we stood, now forest clad and grass grown, but at one time holding within bounds a steaming sea of lava. On the far side of the wide-spreading crater floor, beneath the shadow of yet another great crater, the Oldeani, lay the Magad lake, blue and gleaming in its marshes and its mud flats. Light and shade, wonderful cloud effects, and pygmy thunder- and rain-storms chased one another round the circular wall of cliffs, or hung low above the lake as if to suck up its shallow moisture; or again, at other times stood above the two towering sentinels of Oldeani and Ololmoti, as if the sun-struck banking clouds had once more drawn fire and smoke from their long-dead throats.

This was not all, however, that could be seen from our coign of vantage, for, even without the aid of our glasses, we could see that such a concourse of wild animals was collected within this giant ring-fence as Africa's best big-game days could scarcely surpass. The enclosure of the crater must have reached a circumference of well over 35 miles, giving plenty of room, one would imagine, for all the animals it contained, and yet in many places their numbers were so great that there seemed to be a crush of game.

Before the war the German Government had allowed a family called Siedentopf to occupy land within Ngorongoro. The elder Siedentopf, it appears, took some interest in archæology, and it was due to his research that two barrows were unearthed in the crater, bringing to light two skeletons, so the tale goes, and some interesting ornaments which were found upon them. These may have been merely the graves of former Tatoga chiefs, or they may even have been of considerable antiquity. In any case the find seems to have caught the interest of the then Kaiser, for in 1914 he caused the German archæologist and geologist, Dr. Reck, to proceed to the neighbourhood and undertake a systematic survey of the Great Craters and their surroundings. What the professor found is still a matter of surmise out here, as war broke out shortly after his return to Berlin on the completion of his expedition, but the report goes that it included fossil remains of Dinosaurs, and the discovery of the remains of an ancient civilization, as well as diamonds and gold. Those who met this Dr. Reck report his having said that "his discoveries would one day astonish the world."

The Ngorongoro crater itself and the surrounding country has been plastered at varying intervals of geological time by layers of grey volcanic mud, ash, and sand from the Oldeani and Ololmoti volcanoes when they were active, both these craters being considerably younger. These superimposed strata of volcanic grey mud and sand are seen wherever cuttings have been formed.

Sixty miles to the north-east, between the volcanoes of Oldonyo-Lengai and Gelei, lies a steaming, desolate, grey, mud-plastered country, presenting the same features as once existed right across the volcanic mass of the Engotiek plateau.

To return to the Great Crater and to the cliff from which we were regarding its stupendous features. Presently, after clambering down the last thousand feet, we found ourselves again crossing the Lemunge river and resting beside it on the short clover-sprinkled turf of the crater-bottom. Farther down the stream stood Siedentopf's deserted homestead, and all around us in dense array, with tails swishing and manes bristling, stood, pranced, danced, galloped, and snorted thousands of blue wildebeeste and thousands of zebra. Kongoni hartebeeste and Thomson's gazelle were many, but not filling the landscape to the extent that the gnu and zebra did.

As this side of the crater, the north-east, was practically treeless, and wood and shade therefore became a question of importance for the main camp that we proposed to make, we decided, it being still early afternoon, to continue our march to its south-east curve, with the idea of making our camp on the edge of a belt of acacia forest that we could discern in the distance. This place, which is known to the Masai as Leitokitok, proved to be eminently suitable for our purpose, for we found there good spring water, wood, and shade; it was a long way, however, and took us close on two and a half hours to reach it.

This first march across the floor of this colossal amphitheatre was a wonderful experience, made more so, if that were possible, by the kind of triumphal procession to which we were treated by a never-ending mixed herd of wildebeeste, hartebeeste, zebra, and gazelle. As I say, it took us over two hours, and we were walking through herds of game all the time. Wherever one looked over the far crater-plain there were animals, and looking at them along an absolutely flat surface, they might well be described as a sea of backs with an undercurrent of legs, as they moved hither and thither about us.

We reached the acacia forest at dusk to find that it stood beside an extensive marsh, and debouching directly from the cliffs of the crater-wall into it was a deeply eroded trough (whether made by the action of water or by flowing lava it was difficult to tell) some 30 to 40 feet deep and 200 yards broad. Our camp therefore, when we had it pitched, stood on the same level as and looked out across the flat crater plain, but behind us ran this deep cutting, with the spring at the bottom, extending out towards the lake and its marshy surroundings: an interesting place, as I soon found out, and the only place in the whole crater from which the stratification of its actual floor could be critically examined. On the face of this cutting it was possible to trace with ease the successive inundations of volcanic mud and sand which had been poured into the great crater by the ancient eruptions of Ololmoti, or which had been deposited there at a time when a much larger lake than the present one covered a considerable area of the crater bottom.

The very first day in our new camp produced a novelty, for a rhinoceros who marches up to within 250 yards of a large camp and lies down to sleep in view of everybody, may be considered as such.

We each began to stroll in any direction fancy took us. I went exploring and collecting. No one could get lost, for the grass was like a lawn, and the tents could be seen from at least 10 miles away almost without the aid of glasses. My first ramble was along the marsh to the wild shores of the shallow Magad lake, which, although fed by the Lemunge and other streams, would seem, like Lake Manyara, to have very little rise and fall, with a tendency to diminish rather than increase in size and depth. Its water was potashy and distasteful, except where streams flowed into it. The slimy flats surrounding it were strewn with

petrified mud. There were many cranes, storks, and waterfowl; ducks and geese were in great variety, but they preferred the marsh and the streams to the bitter mud of the lake-shore.

The wealth of game was extraordinary. It has been calculated that before the war the crater contained 50,000 head of wildebeeste and 25,000 head of other game. This number must have been decreased somewhat during Siedentopf's occupation, as he was engaged in slaughtering wildebeeste and drying the meat for the German troops during the war, and also for their long bushy tails, which he and his sons were in the habit of exchanging with the Masai for sheep—the Masai setting great store by these tails for fly-switches. However, judging by the great numbers of calves which accompanied every herd of females, the herds will soon regain their original numbers.

Apart from the blue wildebeeste, the list of animals living in the crater comprised hippo (living in the pools of the marsh), rhino, ostrich, zebra, Kongoni hartebeeste, Thompson's and Grant's gazelle (the latter differing slightly from the usual *Grantii* in the shape of their horns and the bar on the flank), Chandler's reedbuck, oribi, lions, cheetah, hyæna (the large brown spotted species, seen in great numbers in the daytime) and jackal, also in large numbers. Baboons were to be seen in troupes of a hundred or more; there were also numberless guinea-fowl, quail, and the giant bustard or pau.

How such a vast quantity of game manages to subsist and keep its condition, year in and year out (for they never leave the crater), on this one area is rather perplexing, until one realizes after a walk that the pasture is one close mat of succulent white and red clover, in places growing to such luxuriance on the rich volcanic mud and *débris* that acres and acres of it stand knee-deep in one solid mass of green, as if it had been heavily sown and fertilized. Such wild clover pasture I have never before seen, and it is probably unique in the whole breadth of Africa.

The two extinct volcanoes of Ololmoti and Oldeani (one to the north and one to the south) both overshadow the giant central crater of Ngorongoro between them. They stand poised on the edge of its circular crater wall, but their summits reach many thousands of feet above it. As seen from our camp, these two volcanoes, in reality immense, for the crater of one of them is over 3½ miles across, are dwarfed into insignificance by the colossal proportions of the great abyss on the edge of which they stand. Ololmoti, the northern crater, attracted me the most, for not only was it the second largest of the group, but it contained the source of the Lemunge river, which rises within it and gushes out through a curious cleft in its side, as if Vulcan himself had split the great wall with one blow of his hammer.

Having decided to leave the main camp on a trip of exploration to the recent volcano of Oldonyo-Lengai, I resolved, therefore, to first climb

this crater, as I had a great hankering to see into it. I also had it in mind that a sketch made from such a commanding position would be well worth any trouble. To gain the foot of Ololmoti it was first necessary to climb out of Ngorongoro itself, so, selecting a fine morning, I left our main camp with fifteen porters, and taking the same way by which we had come into it, I made the stiff climb up the Lemunge ravine to the edge of the moor upon which we had previously camped. Here I pitched my tent for the night, and on the following morning, which fortunately remained fine, I took four natives and started up the mountain. The ascent from my camp took me a good four hours of climbing before I reached the highest point. Naturally, my followers and I arrived at the top very much out of breath and pretty well fagged, so it was a very mean advantage that two rhino took of us on the very summit, by charging us in the rough scrub, shaking us up very badly after the arduous climb. The whole crater, inside and out, is closely overgrown with arborescent "lad's love" bushes, very hard to push through, but of a fascinating fragrance. No wonder the rhino make their home here, for the crater sides are a mass of fragrant herbs and mints and alpine flowers, and there are some sheltered alpine meadows in the deep folds round this crater that are marvels of beauty, carpeted with a lush green thick-leaved flora, and surrounded by an aborescent kind of broom, and massive moss- and fern-hung Hagenia trees of the utmost grace and beauty. The map gives the impression that the Ololmoti crater is closely covered with primæval forest, but this is wrong, for there are only the very smallest patches of Hagenia forest that could be described as such: fragrant scrub interspersed with patches of coarse grass covers the crater within and without.

My aneroid showed 10,000 feet as the highest point we reached on the lip of the crater. It is a perfect ring some 3½ miles across, and contains quite a respectable mountain in its centre, which is in reality a gigantic core of ash and lava. The catchment of this crater-basin forms small pools and runnels of water on each side of this core, which then drain out through the narrow cleft of which I have spoken, as the Lemunge river. The effect of the Ngorongoro abyss below and the extensive view beyond it to lake Manyara is unsurpassable. The sketch I made gives some idea of it, but only a vivid imagination or an actual visit to the summit of Ololmoti can fill in the colours and the beauty of such a scene.

The following day I struck camp, and, crossing the pass between Ololmoti and the great pile of Loolmalasin, I took a north-easterly direction over the curiously formed bed of an ancient lava lake called by the Masai Embulbul. From here there is a long upward rise along a beautiful moorland valley of splendid close pasture, to a narrow ridge that connects the Elanairobi crater with the Loolmalasin massif. The previous day a great mob of six thousand Masai cattle had used this same track. They were being shifted by the district cattle inspector down into the Rift Valley on account of an outbreak of rinderpest on the highlands. I caught them

up in the late evening and camped beside the lowing herds on the eastern slope of Elanairobi.

By reason of its eastern aspect, facing the rising sun, and also no doubt on account of the ideal conditions of moisture prevailing, this eastern slope of Elanairobi has become a veritable alpine "herbaceous border" of flowers. Amongst those that I could place were a large flowering sweet-scented larkspur, white with black stamens, purple thistles in great bunches, verbena-scented thymes, mints, docks, fennels, borage, sorrel, forget-me-nots, mallows, campions, crow's foot, petunias, poker-plants, ground orchids, at least a dozen kinds of clover and trefoils of a wonderful range of colours from white to salmon-pink, violets, nettles, marguerites with scented leaves (all plants seemed to have scented leaves), wild turnips, Star of Parnassus, purple and white lupins, scabious of many kinds, chamomiles, daisies, and great beds of crinum lilies.

In the morning the Masai grazed their cattle to the edge of the Elanairobi crater, and there I followed them. This extinct volcano is made both interesting and beautiful by reason of the lake it contains. This body of water is over 2 miles across, green-blue in colour, and covered with a heavy metallic film. It is said to be of great depth. The northern interior slope of the crater is covered to the water's edge with primæval forest. Judging by the inundations along the shore-line, there has been a considerable rise recently in the level of this crater lake. The elevation of my camp on the slope of the volcano I made 8850 feet above sea-level, and the low eastern portion of the crater-ring 9360 feet. The highest point of the ring reaches in my opinion an elevation of well over 10,500 feet.

From the north-eastern lip of the Elanairobi crater I obtained my first view of Oldonyo-Lengai, or the Mountain of God, as the Masai call it, who look upon this extraordinarily beautiful volcano with the utmost awe and veneration, which it is hard not to share. This volcano erupted during the war, in January and again in March 1917. The Masai look upon the volcano as sacred and the source of all blessings and benefits for their race. The internal rumblings that preceded the eruptions of 1917 were put down to the bellowings of cattle that were to come out to enrich them. After the last eruption, and when it was safe to approach, the Masai picketed the neighbourhood, allowing no one but a Masai to go near the volcano on pain of death. They afterwards took goats and cattle there, and conducted thither many of their women with blood and milk which was poured out at the foot of the mountain.

There is no previous record of this volcano having been active; it was covered with mountain scrub right to its peak, where there were two small extinct craters. Its height was placed by the Germans at 9350 feet; it must now be considerably higher, and culminates in a single crater on its tapering and graceful summit. The sides are now so steep that it is impossible to climb them.

I reached the "Mountain of God" by way of the barren watercourses that run below it, through the difficult and fatiguing country to the west of the Kerimasi volcano. Even after four years the grey mud from the former is still to be seen covering the ground in many places that are 10 miles or more away from it.

A close view of this entrancingly beautiful mountain is "a sight for the gods." It thrusts its massive yet slender and tapering form upwards from the bed of the rift valley in one glorious pink, grey, and white pyramid, arabesqued with folds and furrows of beautiful shape. A saddle of ash and mud, white and shining, out of which emerge two curiously formed parasitic craters, join Oldonyo-Lengai to the green cliffs of the escarpment. A thin film of vapour rises over the sharply cut edge of the narrow vent, but no glow is perceptible at night.

The grey mud-plastered valley that runs along its southern foot, merging into the steaming lava lake under the volcano of Gelei, might have been transplanted from some other world, so weird and desolate does it appear. The lower part of this valley abounds with steaming parasitic craters, ash-cones, and fumaroles of all sizes and shapes, some of them raised in tiny truncated cones, whilst others have formed themselves into great cracks and round caverns, flush with the surrounding surface of volcanic mud. Eastward, across the lake of lava, and through the swirling yellow and grey fumes, rises the huge pile of the Gelei volcano, a mass of parasitic craters, terraced, and piled one above the other to its high summit.

The saline mud shot out by the eruption of Oldonyo-Lengai has erected a low dam connecting it with the foot of the Gelei volcano, forming yet another basin in the chain of basins on the floor of the East African rift valley.

I would have given a good deal to have been able to penetrate into this steaming wilderness and over to the Natron lake, which I could just see beyond, but time was against me, and I was unprepared for a longer excursion than I had already made, so having obtained some interesting photographs I retraced my weary steps to camp, where by day the flies were an abomination and at night a large species of mosquito swarmed over everything. As these mosquitoes are only found in the vicinity of the Elanairobi volcano, I presume they are bred in its crater lake, where they hatch out and descend in vast buzzing clouds on the surrounding slopes.

The lions of Ngorongoro were what we called "daylight" lions, for owing to their being unmolested they were more often than not to be seen abroad in the daytime. They were located on the opposite side of the water, which decided us to shift camp to the north-west corner of the Magad lake. The crater-wall on this side is cut into at frequent intervals by deeply wooded ravines or kloofs, which had become the

OLOLMOTI FROM THE CRATER OF NGORONGORO

INTERIOR OF OLOLMOTI CRATER LOOKING WEST: LEMUNGE RIVER IN FOREGROUND

LAKE MANYARA LOOKING SOUTH ALONG ESCARPMENT OF ENGOTIEK PLATEAU

OLDONYO-LENGÁI

LAKE MAGAD UNDER THE WESTERN WALL OF NGORONGORO

permanent home of these beasts. Like all other animals within the great crater of Ngorongoro, they were especially tame and especially large and fat, and with fine manes. Preying on the abundant game around them, they had become numerous and bold, offering such sport as is seldom obtained in these days.

Everything in this wonderful crater of Ngorongoro seemed in some subtle way to take to itself an air of enchantment, and to differ from anything ever experienced before. Our new camp, for instance, was a most wonderful place. To be able to overlook the floor of the crater we selected a site well up under the cliffs, on a spur of the great wall that was thickly overgrown with the most enormous candelabra euphorbias I have ever seen; they must have been of great age, for they reached to 40 feet in height, with trunks that were a good 30 inches in diameter. The view of the lake, which was now close, and of the great crater-plain with its crowding game, was a picture to marvel at, set in a frame of branching blue-green euphorbias. Even the magnificent chorus of lions that lulled us to sleep o' nights seemed to be just that much more effective than one had heard elsewhere, from the echoes of the circling cliffs around us.

This western side of the crater differed in many ways from the east which we had just left. The crater-floor was in shallow terraces, as if formed by the receding waters of a lake that possibly at one time extended right across the crater. The foothills of the crater-wall showed masses of fine scoria, which could be picked up in handfuls. Flakes of obsidian were strewn about. Rather curiously, too, there were numerous large anthills on this side, and spread amongst them clumps of fine trees, forming a pleasing park-land near the lake.

In the course of my rambles near the estuary of the Lemunge river I found myself in front of a high ridge of lava, which can in fact be seen for many miles across the crater plain. When examining this I discovered, chipped out of the iron-like lava, two rows of shallow holes, each about 3½ inches wide, forming the "board" of the African native game known in Swahili as *bao*. As this game is unknown to the Masai and never played by them, this is doubtless a relic of the days when the Kisemjangs owned the crater.

We had decided to leave Ngorongoro by mounting the cliffs that form its south-western curve. One fine morning, therefore, found us struggling up one of the many steep Masai cattle-tracks that make their way down into the crater, from the high pasture between the volcanoes of Oldeani and Lemagrut. Having reached the high plateau (8100 feet) that lies beneath Oldeani, we made camp in yet another wonderful spot, this time on the edge of a ravine clothed in primæval forest and beneath gnarled and knotted trees laden with every imaginable parasitic growth, from tiny liver-worts to festoons of orchids and lichens. From our tents we looked out across undulating downs long with feathery grass, to the towering

mass of Oldeani on the far side, whose mantle of green bamboo forest made a streak across the landscape where it met the open pasture in a sharply defined wall of stems. This was a great place for rhino, and their tracks were everywhere in evidence. At sundown a fat old bull came out from the bamboos and took a mud bath, which we watched with interest through our glasses.

Our route presently took us over the shoulder of the Oldeani volcano into the deep basin of lake Eyasi. As we slowly made our way down the steep sides of this volcano a magnificent view unfolded itself—a most splendid picture of wild lake scenery, enhanced by the dark clouds of a thunderstorm that drove across it from the west. The foot of Oldeani abuts right on to the shore of the lake, giving this volcano a towering effect of great grandeur, for it rises sheer from the lake-level. The south-western face of the crater has been riven asunder by an eruption of shattering force that strewed the country below with such a devastation of lava and volcanic *débris* that it has hardly yet recovered. The crater now contains the sources of two streams which flow out from each side of a central core or neck, joining up afterwards into a swiftly flowing stream with an unpronounceable Masai name.

The crater of Oldeani is overgrown within by primæval forest, mostly of ancient white cedars; the northern slopes without by a thick mass of bamboo. The name Oldeani means "The Bamboo Mountain." The higher south-western slope of the volcano has a beautiful alpine flora, among which we found Canterbury bells, yellow cosmos, pink and white geraniums, creamy-white anemones with flowers 4 inches across, and scabious and other beautiful flowers in great variety. The well-known South African sugar bush covered a considerable portion of this side of the mountain with its handsome foliage at an elevation of about 9000 feet.

After painfully descending the steep lava-strewn slopes of Oldeani and crossing many deep cuttings, we were more than glad to find ourselves camped within reach of the lake. The vegetation about us was now of that thorny, rough, and tough description, with many baobab trees, that one associates with the African low veldt. Here, perhaps, it was just a little more tough and thorny, and absolutely broken to pieces by the quantities of rhino that inhabited it. We found the north-eastern lake region to all intents and purposes a desert, which gave us a very trying and hot day's work to cross. In its character it resembled a Mexican steppe, with thick-leaved plants, aloes, cacti, and euphorbias. After crossing this barren land we camped on the Katete river, a muddy stream of fresh water that flows into Eyasi on its eastern side. The palm-fringed mouth of this river is the haunt of thousands of hippo; their numbers are prodigious, and I am told formed the staple fat-supply for the German army during the war. There are some giraffe in this region and a few gerenuk, as well as other small game.

My wife and I, accompanied by thirty porters, now made the best of

our way over the Ngabora mountains towards a native track that leads into the Government station of Mbulu. A local Wambulu native, who had been sent out to us by the Assistant Political Officer at this place, lost us in these unknown hills and there shamefully deserted us in a waterless country, making his own way back to his home. After an excessively trying journey through dense thorn scrub overrun with rhino and elephant, we eventually reached the first habitations of the Wambulu with our clothes torn to shreds and our food-supply at an end. Two days afterwards we reached the old German boma of Mbulu.

The Wambulu natives occupy the high and fertile plateau of Iraku. They are an interesting, industrious, and intelligent people of Nilotic origin, tall, with fine features and in many ways similar to the Watuzi of Ruanda. Owing, however, to the continuous raids of the Masai in former times they are not numerous. They are very clever pastoralists and agriculturists, both the men and women working hard tending their large stocks of cattle, sheep, and goats, and growing large and well-matured crops of maize, rice, sorghum, millet, eleusine, beans, yams, many kinds of native vegetables, and European potatoes; they also raise quantities of fowls.

The Mbulu country has an exceedingly pleasing aspect with its well-ordered, often terraced, patches of cultivation, its quaint houses, its herds of cattle and sheep, its curious combination of clumps of thin-stemmed, tall phœnix-like palms (with orange-coloured fruits), with large stretches of heather and bracken and clumps of graceful tree-ferns along the many beautiful streams.

The country in many respects resembles Ruanda, but there are no bananas, and it is cultivated to an extent that is never seen there. It is extremely well watered, with a rich pasty soil of pink mica-schist through which run large seams of mica and pink quartz. The contour of the highlands of the great craters to the north has been altered by the hoofs of milliards of cattle passing across the centuries; here the run of the land has been altered by the hand of man, for with the flight of time and a continual scooping out of the sides and heads of the watercourses for cultivation, the face of the country has been much changed.

Near the White Fathers' mission of Mbulu is a small lake in and around which live many pythons, which are held in veneration by the Wambulu. The natives in the vicinity have the curious custom of carrying back to this lake any python that is found any distance away from it.

To take us on our southward journey down to the Ufiome country, the Assistant Political Officer supplied us with a fine lot of Wambulu carriers, who took us along the well-graded German road (with deep cuttings) that runs through their fine country. The second day took us off the "berg" (7000 feet) down into the forest of the Rift Valley (4750 feet), passing through some fine scenery *en route*. After crossing the Eer river, the fourth day brought us to Dodo's village, which lies beneath the massive ruins of a volcano named Ufiome in the district known as Bonga,

a small basin or drainage system, complete in itself, on the floor of the Rift Valley, on the lowest portion of which is the picturesque Klaui lake. On the northern side of the basin are several extinct craters.

From Ufiome we gradually made our way to the Tanganyika railway. We changed porters at Kondoa Irangi, finding the Political Officer in charge a most entertaining and hospitable man. He gave me, among much interesting information, the following story of the "Kondoa Fire King," with which I must close these notes:

"I have had an opportunity of watching closely a native conjurer of my acquaintance who possesses a secret which would be invaluable to a fire-brigade. He smears himself with what is apparently a vegetable oil which renders his skin impervious to flame. I have taken a photograph of him holding a blazing bottle-straw within an inch of his naked armpit. He scorches his skin for as long as you like, and the closest inspection reveals no damage. On one occasion, in the presence of the Bishop of Kilimanjaro, Mr. Bampfylde, and the whole of my family, this native brought a bundle of sticks into my back yard, and under the scrutiny of the afore-mentioned audience, he pounded up leaves taken from two trees, mixed the resulting juice with water from my kitchen, and scorched himself as usual. I smeared some of his juice under my own arm and applied the flame myself closely for half a minute. I could feel only a pleasant warmth, and felt no pain either then or afterwards. No mark was left on my skin, and even the hair of my arm was uninjured. Both the trees whose leaves he used are common."

Note added by Mr. Heawood.

EARLY INFORMATION ON THE HIGHLANDS OF THE GREAT CRATERS

It may be of interest to note that, many years before this region was first traversed by a white man, some rough inkling of certain of its features had been gained through the careful inquiries of the early missionaries. In particular the great mountain Oldonyo Lengai (or Donyo Ngai), the "Mount of God," had already appeared in the famous "Mombas Mission Map," which did so much to turn attention to the East African interior about the middle of the nineteenth century. Somewhat later the data collected by the missionaries Wakefield and Farler, interpreted and mapped by geographers like Keith Johnston and Ravenstein, had supplied descriptions which made a forcible appeal to the imagination of would-be explorers. The mountain was said to be even higher than Kilimanjaro, though not so massive; to be a volcano with a *menara* (tower or peak) on the top, from which smoke constantly ascended, causing a perpetual black cloud above it; and to exhibit "radiating and coruscant appearances." Ngorongoro also figures in the early itineraries, not far from its true position, and would seem in those days to have not lain so aloof from caravan routes as Mr. Barns says it does to-day. It was described as a thickly populated Masai district with many villages, in a country full of big game, where the caravans remained about twenty days to trade and hunt. Maps constructed from such native information were published by this Society (*Journ. R.G.S.*, vol. 40, 1870, p. 303; *Proc. R.G.S.*, N.S., vol. 4, 1882, pp. 776), accompanied by the text of the itineraries.

NOTES ON THE TECHNIQUE OF BOUNDARY DELIMITATION

Arthur R. Hinks, M.A., F.R.S., Sec. R.G.S.

[The following notes were prepared in 1918 at the request of Colonel Sir Coote Hedley, R.E., then chief of the Geographical Section, General Staff. More urgent work intervened, and they were never finished; nor are they now likely to be. But as they contain material which may be useful to students of political geography, they are now published in their rough state. I am much indebted to Mr. Reeves for help in collecting the material.—A. R. H.]

THE considerable literature of the last few years on the geographical principles of boundary delimitation has discussed many difficulties in a general way, and pointed out errors of definition from which those difficulties arose. In view of the present great activity in making new boundaries, it may be useful to collect concisely the main facts of leading cases, with reference to the sources, often rather inaccessible, where full details may be found.

These notes will be limited to the technique of boundary delimitation, avoiding the more doubtful questions of political principle.

The origins of boundary difficulties are curiously varied: inexact definition, as on the Alaska boundary; unsuitable definition, as on the Uganda–Congo boundary; contradictory definition, as on the Chile–Argentine boundary; definition by unascertainable previous jurisdiction, as on the Peru–Bolivia boundary. All such have the common ingredient of geographical ignorance at the time of delimitation. Much rarer are cases of faulty demarcation, as on the South Australia–Victoria boundary.

Uganda–Congo–German East Africa. 30th Meridian.

The Treaties and Conventions are found in Hertslet, 'The Map of Africa by Treaty,' third edition, 1909. Numbers 128 and 149 are translations into English; 163 and 270 were apparently done in English.

The earliest definition of the boundaries of the International Association of the Congo is in the Convention with Germany, 8 November 1884 (No. 160), where Article VI. reads: "The German Empire on its part is ready to recognize the frontiers of the territory of the Association and of the new State which is to be created, as they are shown in the annexed map."

The map was not published with the Convention, but the map by Friederichsen (Hertslet, p. 604), "taken from the copy annexed to the 9th protocol of the Berlin Conference 1884–85 and published in German Brown Book" shows the boundary according to this treaty, agreeing with its definition below in the Circular of 1 August 1885.

The Declaration exchanged between the Government of Her Britannic Majesty and the International Association of the Congo, 16 December 1884, does not mention boundaries.

The General Act of the Conference of Berlin, signed 26 February 1885 (Hertslet, No. 128), in the Declaration Relative to Freedom of Trade, defines the basin of the Congo as comprising "all the regions watered by the Congo and its affluents, including Lake Tanganyika, with its eastern tributaries." The protocols are not in Hertslet, but are published in State Papers, vols. 75 and 76. The map by Friederichsen shows also the limits of the basin of the Congo as thus defined.

But the Congo State did not claim the whole basin. In the Circular of the Administrator-General of the Department of Foreign Affairs of the Independent State of the Congo, declaring the neutrality of the State, within the limits as defined by Treaties, Brussels, 1 August 1885 (Hertslet, No. 149), the eastern boundary is thus described:

"The 30th degree of longitude east of Greenwich up to 1° 20′ of south latitude [the word 'up' is perhaps a bad translation];

"A straight line drawn from the intersection of the 30th degree of longitude by the parallel of 1° 20′ south latitude as far as the northern extremity of Lake Tanganyika;

"The median line of Lake Tanganyika, . . . etc."

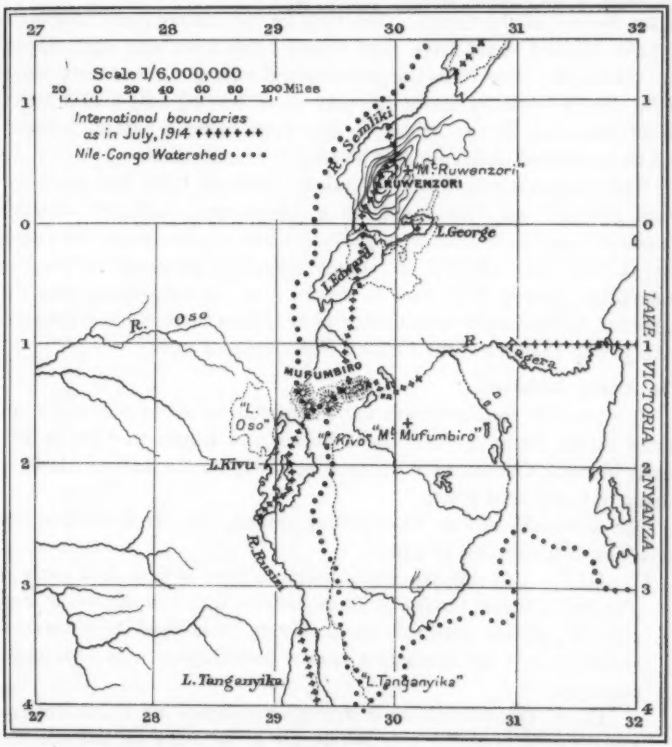
This is the first specific mention of the 30th meridian. At this time Ruwenzori and Lakes Edward and Kivu were undiscovered. The map shows an uncertain Lake Nzige on the Congo side of the boundary.

The boundary between British and German East Africa was defined in the agreement of 1 July 1890 (Hertslet, No. 270), thus: ". . . to the point on the eastern side of Lake Victoria Nyanza which is intersected by the first parallel of south latitude; thence, crossing the lake on that parallel, it follows the parallel to the frontier of the Congo Free State, where it terminates. It is however understood that, on the west side of the lake, the sphere does not comprise Mount Mufumbiro; if that mountain shall prove to lie to the south of the selected parallel, the line shall be deflected so as to exclude it, but shall nevertheless return so as to terminate at the above-named point."

At this time "Mount Mufumbiro" was known only from the distant views of it obtained by Speke in 1861 and by Stanley in 1878. Ruwenzori and Lake Edward had just been discovered by Stanley on the Emin Relief Expedition, but his discoveries were hardly known when the Agreement was under discussion. For many years afterwards it was supposed that Ruwenzori lay east of the 30th meridian, and thus outside the self-defined boundary of the Congo State. But the growing knowledge of the remarkable nature of all this country of the Western Rift should have forbidden the perpetuation of the geometrical boundary in the Agreement between Great Britain and the Congo State signed on 12 May 1894 (Hertslet, No. 163), where in Article I. (*a*) "It is agreed that the sphere of influence of the Congo State shall be limited to the north of the German sphere in East Africa by a frontier following the 30th meridian east of Greenwich up to its intersection by the watershed between the

Nile and the Congo, and thence following this watershed in a northerly and north-westerly direction."

This Agreement was complicated by two leases. The first was designed to give to Great Britain a strip 25 kilometres wide of Congo territory from the north end of Tanganyika to the south end of Lake Edward, presumably for a Cape-to-Cairo route. This was quickly abandoned on protest from Germany that such a lease was contrary to the Agreement of



THE COUNTRY OF THE UGANDA-CONGO-G.E.A. BOUNDARY

The positions of the principal features as given on the best maps existing at or shortly after signature of the agreement in 1890 are shown by dotted lines.

1890, which made the German sphere "conterminous with the Congo Free State" (No. 270, Art. I. 3). The second lease gave the Congo extensive territory in the Nile valley, extending north nearly to Fashoda, with a strip from the watershed to the western shore of Lake Albert and the port of Mahagi. The greater part of this lease was also soon abandoned, and the details are not important to our present purpose.

When in the course of a few years the almost unknown country

divided by these boundaries came to be explored—a country unrivalled in the whole world for its strongly marked and magnificent features—the glaring unsuitability of a geometrical division became evident. Ruwenzori was so much further west than had been supposed that the meridian cut across its eastern gorges. Mount Mufumbiro proved to be a whole region of volcanoes, some of them active, and lying not only south of the first parallel of south latitude, but west of the 30th meridian, so that their inclusion in the British sphere by the agreement with Germany had been at the expense of the Congo. The strip for the railway from Tanganyika to Lake Edward would have gone across Lake Kivu and right through the volcanoes. The Nile–Congo watershed west of Lake Albert proved to be almost vertically above the lake-shore, leaving only a cliff face to be administered by the British, so that even where a natural boundary had been adopted in intention, it was highly inconvenient.

With comparatively small exceptions—such as "the first parallel of south latitude" for "the parallel of 1 degree south latitude"—the definitions of these boundaries were perfectly clear as geometrical definitions; but as they were adopted in almost complete ignorance of the very remarkable country they were to divide, it is not astonishing that they proved to be thoroughly unsuitable, and after long surveys and negotiations were greatly changed at the Brussels Conference of 1910.

The Alaska Boundary.

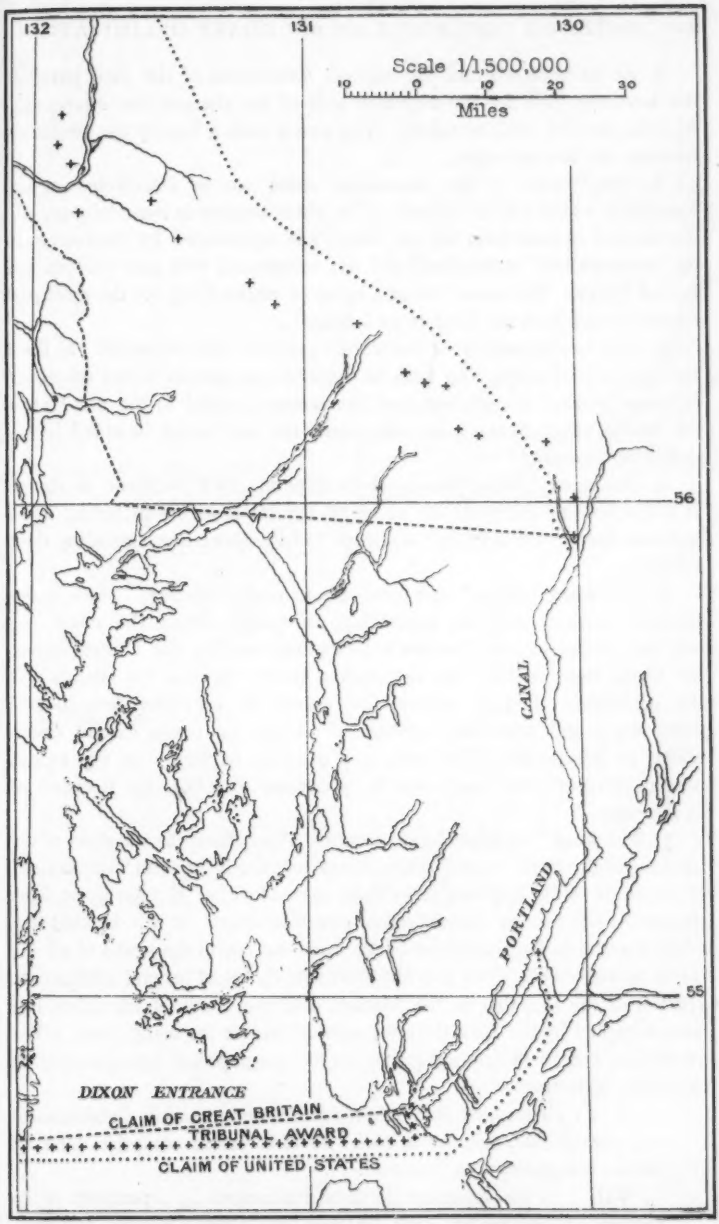
The question in dispute was the interpretation of the definitions contained in the treaty between Great Britain and Russia in 1825 and the nearly identical definitions in the treaty of 1867 on the sale of Alaska by Russia to the United States.

The definitions include the following phrases, and the words that have given rise to dispute are in italics:

> III. . . . la dite ligne remontera au nord le long de la *passe dite Portland Channel*, jusq'au point de la terre ferme *ou elle atteint le* 56e *degré* de latitude nord; de ce dernier point la ligne de démarcation suivra *la crête* des montagnes situées *parallèlement* a la *côte*, jusq'au point, etc.
>
> IV. 2. Que partout où la *crête* des montagnes qui s'étendent dans une direction *parallèle* à *la côte* depuis le 56e degré de latitude nord au point d'intersection du 141e degré de longitude ouest se trouverait à la distance de plus de 10 lieues marines de *l'ocean*, la limite . . . sera formée par une ligne parallèle aux *sinuosites de la côte*, etc.

Scarcely a phrase of these definitions was free from difficulty.

1. The Portland Channel was navigated and named by Vancouver, who described it rather minutely in words that did not always agree perfectly with his chart. It has three mouths, or passages that might be considered mouths. The passage chosen by a majority of the arbitrators was not that traversed by Vancouver, has a separate name, and makes a sharp angle with the general direction of the channel.



THE ALASKA BOUNDARY: PORTLAND CANAL

Claims of Great Britain and the United States, and Award of the Tribunal. The Tribunal chose various summits to define the boundary, but did not delimit it in detail. The chosen points only are shown in the sketch.

2. At its northern end the channel forks south of the 56th parallel; the definition does not say on which side of the channel the intersection with the parallel shall be taken. The award took a line up the peninsula between the two branches.

3. The "crest" of the mountains could not be interpreted as the watershed, which was far inland. The whole country is mountainous, and the skyline, as seen from the sea, which was represented by Vancouver in the conventional "caterpillar," did not correspond with any well-marked line of peaks. The award chose a series of peaks lying for the most part nearer the sea than the limit of 10 leagues.

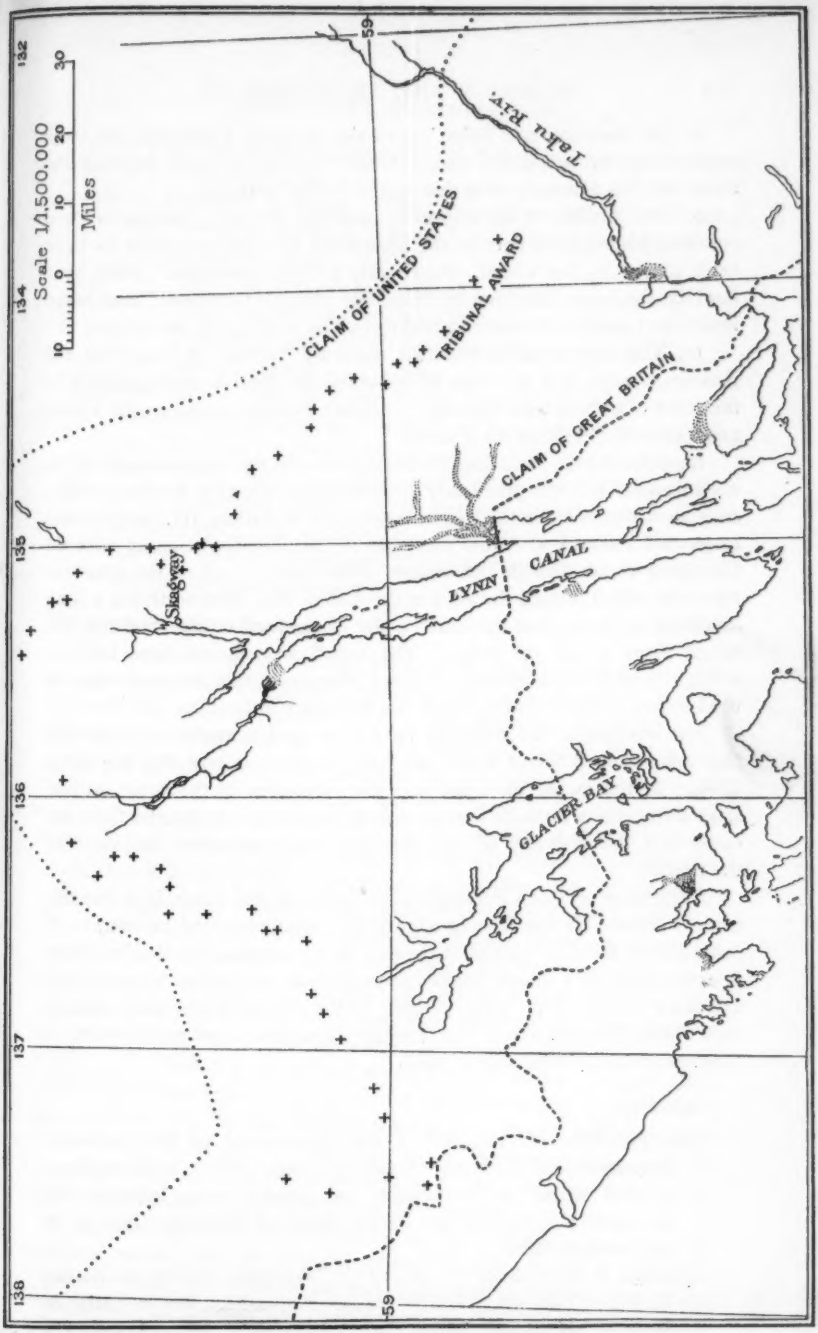
4. The interpretation of the word "parallel" was disputed. If there are two parallel ranges, can both be described as parallel to the sea-coast, or is one parallel to the coast, and the second parallel to the first? or, is the nearer range to the coast necessarily the only range included in the definition "parallel"?

5. The word "coast" was much in dispute. Is it the same as shore? Is it the limit of the open sea, or of all territorial waters including inlets however deep? Or is it the "envelope" of the shore-line, excluding deep inlets?

6. The word "ocean" also gave rise to much difficulty. Since it was common ground that the archipelago of islands along the coast was originally Russian, and therefore subsequently went to the United States, the ocean must include the land-locked waters between the islands and the mainland. Did it include the waters of an inlet less than 6 miles wide, and therefore territorial? Does the ocean extend everywhere to the coast? This was not decided explicitly by the award, but in this particular case may be presumed to follow the decision as to the coast.

7. The word "sinuosity" gave trouble. Apart from the question of the meaning of the word "coast" alone, it was doubtful if the term "sinuosities" of the coast meant anything more than coast alone, or if coast apart from sinuosities was not the generalized or envelope coast. It was decided that a line parallel to the sinuosities of the coast ran round the heads of all the inlets, however deep; but it is not clear that this is of general application, apart from the fact that in the Alaskan case the heads of the inlets had been occupied by the United States without protest for many years. The award was not, in fact, based purely on the geographical interpretation of the treaty definitions.

> V. . . . les sujets Britanniques ne formeront aucun établissement soit sur la côte, soit sur la *lisière* de terre ferme comprise dans les limites des possessions Russes. . . .
>
> VII. . . . les vaisseaux de deux Puissances . . . pourront réciproquement fréquenter, sans entrave quelconque, toutes les *mers intérieures*, les *golfes*, havres, et *criques* sur la côte mentionnée dans l'article III. . . .



THE ALASKA BOUNDARY: NEIGHBOURHOOD OF SKAGWAY

This section illustrates the importance of the precise meaning to be attached to the words "ocean" and "coast."

8. The meaning of "lisière" gave rise to some discussion, but there seems to be no real doubt that it means the strip of coast between the shore and the mountain crest that was to be the boundary.

9. The question of the respective meaning of "mers intérieures" and "golfes" played some part in the arguments, but does not seem to have been settled by the award. Apparently a "mer intérieure" must be a fiord like the Lynn Canal, not an inland lake; that is, "intérieur" must mean landlocked rather than inland; and it may be included in the ocean.

10. The arguments showed that the word "creek" is dangerous, the Americans using it in the sense of tributary, the British more generally in the sense of a small tidal opening. Compare Bonanza Creek on the Yukon and Deptford Creek on the Thames.

Lord Alverstone has a long written opinion on the interpretation of the word "coast," but it is principally directed to the question whether a reference in Article VII. to the "coast mentioned in Article III." is the coast in general referred to in the preamble of that Article, ". . . la côte du Continent et les Iles de l'Amérique Nord-Ouest . . .," or the coast in particular which formed the edge of the *lisière*. Mr. Aylesworth has a long argument to prove that the coast is the generalized outline, and not the actual shore of all the inlets. The award was against him, but the ambiguity, and the admission of Lord Alverstone that the word may be used in two or more senses, make care necessary in its use.

The wording of the treaty of 1825 is a good example of the doubts that arise when different words are used for what is probably the same thing. By the award the coast and the sinuosities of the coast are the same thing, and a distance measured from the ocean is measured from the coast, but the diversity of the language was responsible for most of the trouble.

A question of much importance will arise on this coast, if it has not already arisen. Is the floating edge of a glacier reckoned as coast? A large inlet is filled by glacier at the date of the award, and the boundary is demarcated on a line of peaks not more than 10 marine leagues from the coast defined by the glacier edge. If the glacier recedes very much it may open a channel across the boundary, and give a sea outlet where it was intended that none should exist.

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The Argentine-Chile Boundary.

The Cordillera of the Andes, which is in much of its length an impassable barrier, had long been accepted in a general way as dividing the territories which became respectively the Argentine Republic and the Republic of Chile. But as settlement extended certain districts were occupied which were not very obviously on one side or the other of the chain, since there are rivers rising on the Argentine pampas that make their way through the mountains to the Pacific, and in the far south the Andes descend into complicated hilly country intersected by deep fiords.

In 1881 a Treaty of Boundaries was made between the two Republics, and both sides began to explore the doubtful territory, which was in many places quite unknown. In the Protocol of 1893 the boundary was further defined, and provision was made for discussion by experts from each side, with reference to arbitration in case no agreement was possible. The experts having failed to agree in respect of three considerable stretches of the boundary, the dispute was referred to the arbitration of Great Britain. A tribunal of arbitration sat in London in the spring of 1899, and in accordance with the terms of the reference a British Commission under Colonel Sir Thomas Holdich surveyed the ground and reported to the Tribunal. The award was made on 20 November 1902, and the boundary demarcated by representatives of the two Republics, under the general superintendence of the British Commission.

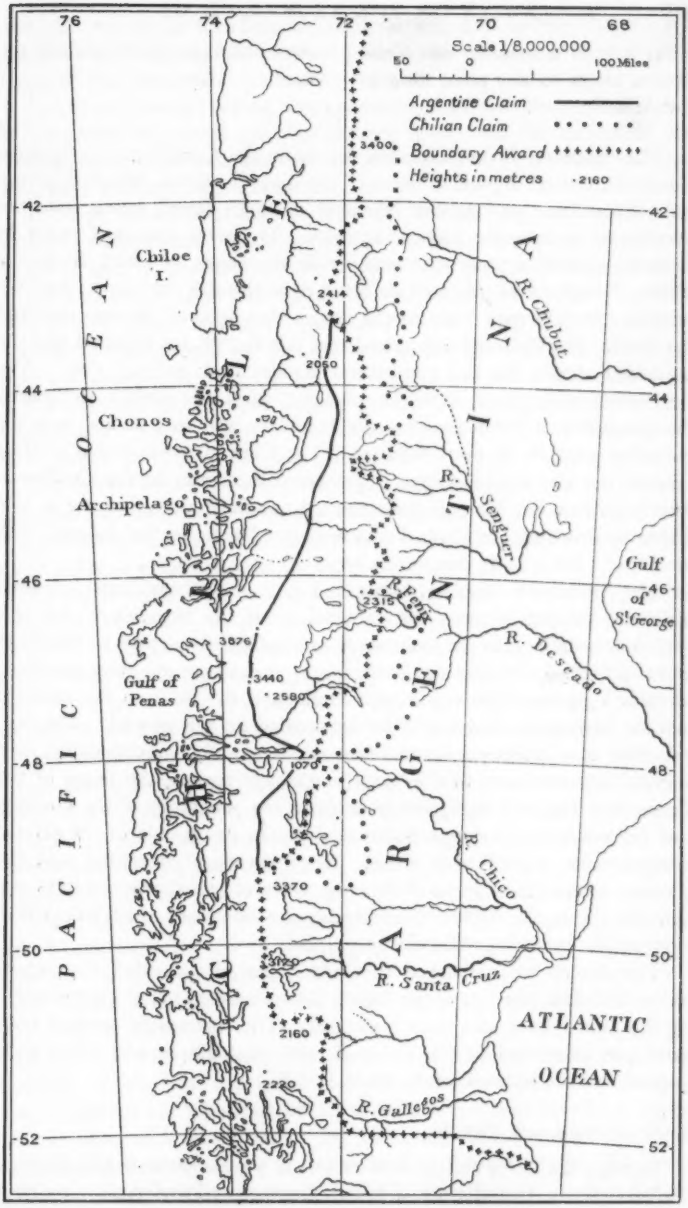
The details of the case, especially in the extreme south, are very complex, but the principal difficulty, arising from superfluity of definition, is easily traced. The arbitration was conducted in English, and it will be necessary to compare the translations of the Treaty and Protocol provided in the cases of the two sides.

Treaty of 1881.

Argentine translation.	*Chilean translation.*
Art. I. The boundary between the Argentine Republic and Chile from north to south as far as the parallel of 52° south is the Cordillera de los Andes. The frontier line shall run in that extent along the most elevated crests of said Cordillera that may divide the waters, and shall pass between the slopes that shall descend on one side and the other.	The boundary between Chile and the Argentine Republic is from north to south, as far as the 52nd parallel of latitude, the Cordillera de los Andes. The boundary line shall run in that extent over the highest summits of the said Cordillera which divide the waters, and shall pass between the sources (of streams) flowing down to either side.

Protocol of 1893.

I. Whereas Article I. of the Treaty of 23 July 1881 provides "that the boundary between Chile and the Argentine Republic from north to south as far as the parallel of latitude 52° S. is the Cordillera de los Andes," and that "the frontier line shall run . . . (as above) 2, the Experts and the Sub-Commissions shall observe this principle as an invariable rule of their proceedings. Consequently all land and all waters, to wit: lakes, lagoons, rivers, and parts of rivers, streams, slopes situated to the east of the line of the most elevated crests of the Cordillera de los Andes that may divide the waters shall be held in perpetuity to be property and under the absolute dominion of the Argentine Republic . . . etc.	Consequently there shall be held as perpetually belonging to the Argentine Republic and under its absolute dominion all the lands and all the waters, to wit: lakes, lagoons, rivers and parts of rivers, brooks, springs lying to the east of the line of the highest summits of the Cordillera de los Andes which divide the waters . . . etc.
II. The undersigned declare that in the opinion of their respective Governments and according to the spirit of the Boundary Treaty, the Argentine Republic retains her dominion and sovereignty over all the territory that extends from the east of the principal chain of the Andes to the coast of the Atlantic	territory extending to the east of the main range of the Andes as far as the Atlantic coast. . . . Chile



THE ARGENTINE-CHILE BOUNDARY

The watershed line claimed by Chile: the line of the highest peaks claimed by Argentina; the basins of internal drainage; and the line awarded by the Tribunal.

. . . in such a manner that Chile cannot claim to any point towards the Atlantic. . . .

cannot claim any point towards the Atlantic. . . .

The boundary is thus variously defined as the Cordillera; as the most elevated crests or highest summits of the said Cordillera, which may very well be outliers; and as the principal or main chain, which does not necessarily include the highest summits. Moreover, the said crests or summits were to be those that may divide the waters, or which divide the waters, though rivers may and do break right through the chain; and the boundary was to pass between the slopes that descend on one side and the other. The Chileans maintained that this last phrase required that the boundary should be the continental divide, and nothing else. The Argentines maintained that the phrase "parts of rivers" recognized the possibility of rivers crossing the boundary, and that at any rate the boundary must lie in the Cordillera. The Chileans replied that in their opinion the low divide on the Argentine pampas was in the Cordillera. The Argentine Dr. Moreno demonstrated the indefinite character of this divide by diverting the River Fenix from the Pacific to the Atlantic, with the aid of a few men in one week's work.

The Arbitration Tribunal recognized at an early stage that a cardinal difference existed between the contentions of the two sides. An orographical boundary, as the main range of the Cordillera, may be indefinite if the individual summits along which it is to pass are not fully specified, whereas a hydrographical line, the continental divide, from the moment that the basins are named, may be demarcated on the ground. The orographical and hydrographical lines are frequently irreconcilable, and neither fully conforms to the spirit of the agreements, the terms of the Treaty and Protocol being inapplicable to the geography of the country, and the wording of the agreements ambiguous, susceptible of the diverse interpretations placed upon them. They therefore concluded that the question was not simply that of deciding which of two alternative lines was right or wrong, but rather to determine the boundary which would best interpret the intention of the treaty.

The Award was published in State Papers, but neither the report of the Tribunal, nor that of the British Commissioner, nor the maps showing the award, have ever been published. The voluminous cases of both parties, as submitted to the Tribunal, with photographs and maps, were printed, and are in the Library of the R.G.S.

South Australia and Victoria.

In 1834 the Act 4 and 5 William IV., c. 95, empowered His Majesty "to erect South Australia into a British Province or Provinces . . . within that part of Australia which lies between the Meridians of the One hundred and thirty-second and One hundred and forty-first Degrees of East Longi-

tude . . . and to fix the respective Boundaries," and Letters Patent were issued on 19 February 1836 defining the eastern boundary as the 141st degree of east longitude.

In 1839 a surveyor named Tyers determined the difference of longitude between Port Macquarie (Sydney) and a mark near the mouth of the Glenelg River in the neighbourhood of this meridian, by a mixed method, principally transport of chronometers.

In 1846 the Governments of New South Wales and South Australia agreed to demarcate the boundary, and instructed a surveyor named Wade for the former, in co-operation with a Mr. White for the latter, to deduce the position of the 141st meridian from Tyers' mark, and to cut it northward to the River Murray. A portion of the line was marked and proclaimed the boundary on 11 December 1847 by the Lieutenant-Governor of South Australia in these words: "the line so marked as aforesaid . . . as the meridian of the 141st degree of east longitude, is and shall be deemed and construed to be the eastern boundary of the Province of South Australia, to all intents and purposes. . . ."

The Wade–White line was afterwards continued to the River Murray. This part of New South Wales afterwards became the colony of Victoria. It appeared subsequently that the northern end of the boundary so marked was 2 miles 19 chains west of the 141st meridian.

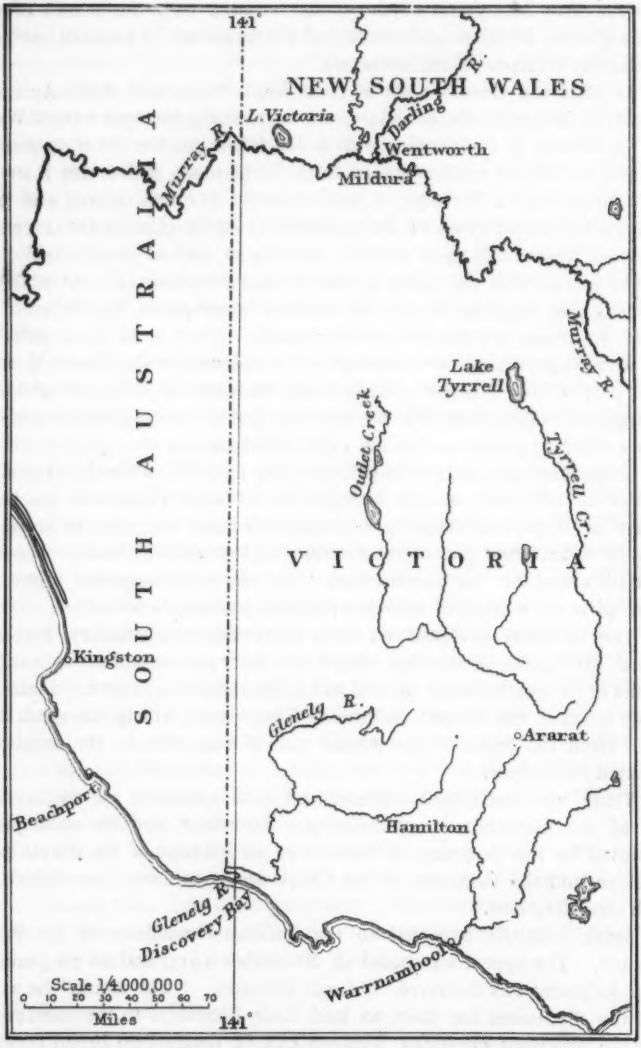
South Australia, after trying from 1869 onwards to obtain a rectification of the boundary, in 1911 brought a suit against Victoria in the High Court of Australia, claiming a declaration that the strip of territory 2 miles wide forms part of the territory of the plaintiff State. The suit was dismissed on the ground that "the claim to have the boundary rectified is not a cause of action capable of judicial decision."

The technical evidence on both sides was unsatisfactory, and the actual divergence of the boundary from the 141st meridian at various points of its length cannot be said to be determined even now. Plaintiffs made much of the alleged badness of Tyers' work, which was good, and overlooked the origin of the greater part of the error, in the longitude adopted for Sydney.

There was much legal argument on such questions as, whether the act of the Governor in proclaiming a boundary, and its subsequent approval by the Secretary of State, was an exercise of the Royal prerogative, and the judgment of the Court seems to have been based on such considerations.

South Australia appealed to the Judicial Committee of the Privy Council. The appeal was heard in November 1913, and on 28 January 1914 judgment was delivered by Lord Moulton. "The result," he says, "of the discussion has been to lead their Lordships to the conclusion that the important questions involved can be decided on broad general principles independent of much that has been brought before them." Counsel for the plaintiffs had argued that the boundary had been fixed by

Order in Council as the 141st meridian; that nothing but an Act of the Imperial Parliament could alter it; and that no Act had been passed either altering it or giving power of alteration. He admitted that the



THE VICTORIA-SOUTH AUSTRALIA BOUNDARY

The strip between the demarcated boundary and the 141st meridiau lost to South Australia by the original error of demarcation at the southern extremity.

meridian could never be fixed with absolute accuracy, and that therefore the boundary, however carefully fixed, could never be said to be the legal boundary or to warrant the claim of either Colony to exercise jurisdiction up to it in view of the possibility that a redetermination of greater accuracy might shift its position. "But the Privy Council refused to entertain this inconvenient doctrine." To hold in favour of the Appellants would be to say that the provision of the Letters Patent contemplated the continued existence of a No Man's Land of finite breadth over which the authorities of neither Colony could legitimately assert authority, and which, though no doubt its breadth might be reduced as the advance of science diminished the probable error of the observation, could never be wholly extinguished. Judgment was given dismissing the appeal, and the boundary as marked and proclaimed, though wrong, is allowed to stand.

It is not clear, however, that this judgment is of general application, and that any boundary so marked with accuracy appropriate to the time, and proclaimed, must stand. The boundary of South Australia thus marked, 2 miles and more west of the assigned meridian, was within the limits of 132° and 141° of east longitude within which the Crown was authorized to erect a British Province under the Statute. Had the error been east instead of west this would not have been the case, and the result might have been different.

The Peru–Bolivia Boundary.

The position of the boundary between Peru and Bolivia and north of Lake Titicaca had been the subject of discussion ever since those States had become independent of Spain. Peru claimed all territory which was in 1810 included in the Spanish Viceroyalty of Peru and subject to the Audience Chamber of Lima; Bolivia claimed all that had been in the jurisdiction of the Audience Chamber of Charcas in the former Viceroyalty of Buenos Aires. The territory in dispute was largely in the basin of the Amazon north and east of the Cordillera of the Andes, and the case was complicated by the fact that agreements between Bolivia and Brazil purported to dispose of territory claimed by Peru. After much discussion the question was by the Treaty of 30 December 1902 referred to the arbitration of the Government of the Argentine Republic.

The award of the arbitrator was given on 9 July 1909. It confessed inability to decide the question on the basis of the jurisdiction of the Audience Chambers, since in the region under dispute their boundaries were defined as "undiscovered provinces" and the district was up to a recent date quite unexplored. The arbitrator therefore took advantage of a clause providing for this contingency, which allowed him "to settle the question equitably."

The boundary delimited in this award was based on very imperfect geographical information; it was partly a geometrical boundary, and

partly defined by watersheds and rivers whose positions were very doubtful.

By the "Protocol of Acceptance" of the award considerable changes were made in the delimitation, which in its modified form contained three definitions which gave trouble:

1. The boundary, which was being defined from south to north, having reached parallel 14° south, was to continue along this parallel to its intersection with the River Lanza, and along this river to its junction with the Tambopata. This confluence proved to be south of the parallel, and the spirit of the agreement was unrealizable, even if it were literally possible of execution.

2. The boundary was to strike to "the western source" of the Heath, a river which was found to rise "amongst a wilderness of forest-clad precipices and ridges, between each of which runs some sort of mountain stream," so that identification of the most westerly source proved impracticable.

3. When the boundary left the River Madre de Dios and struck north-west across the Amazon forest, it was to pass "westwards of the barraca of Illampu." How much west was not stated, and there was dispute as to the meaning of the word "barraca," whether the principal house, or the whole of a large concession.

Commissions to demarcate the boundary took the field in 1911. At the beginning of the second field season it was mutually agreed—

1. To substitute for the parallel 14° south the parallel 12′ south of the Lanza–Tambopata confluence.

2. To accept the westerly source of the Heath that lay nearest to a defined watershed-line.

3. To define the point westward of the barraca of Illampu as the point on the right bank of the river Manuripe halfway between the meridians of the principal houses of Illampu and San Lorenzo—a complex definition.

The boundary was surveyed and in great part demarcated in the years 1911–13. The reports of the British officers of the Peruvian Commission, with diplomatic memoranda and maps, were edited for the Peruvian Government by the Royal Geographical Society, and issued in 1918. The commissioners made valuable remarks on the difficulty of maintaining the boundary pillars in tropical forest country.

Canada—United States.

The complicated history of this boundary goes back at least as far as the grant of Nova Scotia to Sir William Alexander in 1621, and the demarcation is still in progress. A good summary of the history is given in Mr. James White's treatise on 'Boundary Disputes and Treaties,' reprinted from 'Canada and its Provinces' for private circulation in 1914, of which a copy is in the library of the R.G.S.

Reserving reference to the earlier history for the elucidation of

particular points, we begin with the definition of boundaries contained in the Treaty of Paris of 1783, which definition is identical with that of the preliminary treaty of 1782. It is common ground that the geography of the treaty was based on Mitchell's map of 1755. The words that gave rise to difficulty are printed in heavy type.

"Article II. . . . that all disputes which might arise in future on the subject of the Boundaries of the said United States may be prevented, it is hereby agreed and declared, that the following are and shall be their Boundaries, viz. from **the north-west angle** of Nova Scotia, viz. that angle which is formed by a line **drawn due north** from the **source** of **St. Croix river** to the **Highlands**; along the said Highlands which divide those rivers that empty themselves into the River Saint Lawrence from those which fall into the **Atlantic Ocean**, to the **north-westernmost** head of Connecticut River; thence down along the middle of that river to the **45th degree** of north latitude; from thence . . . through Lake Superior, northward of the Isles Royal and **Phelipeaux**, to the **Long Lake**; thence through the middle of said Long Lake, and the **water communication between** it and the Lake of the Woods, to the said Lake of the Woods; thence through the said Lake to the **most north-western point** thereof, and from thence on a **due west course to the River Mississippi**. . . .

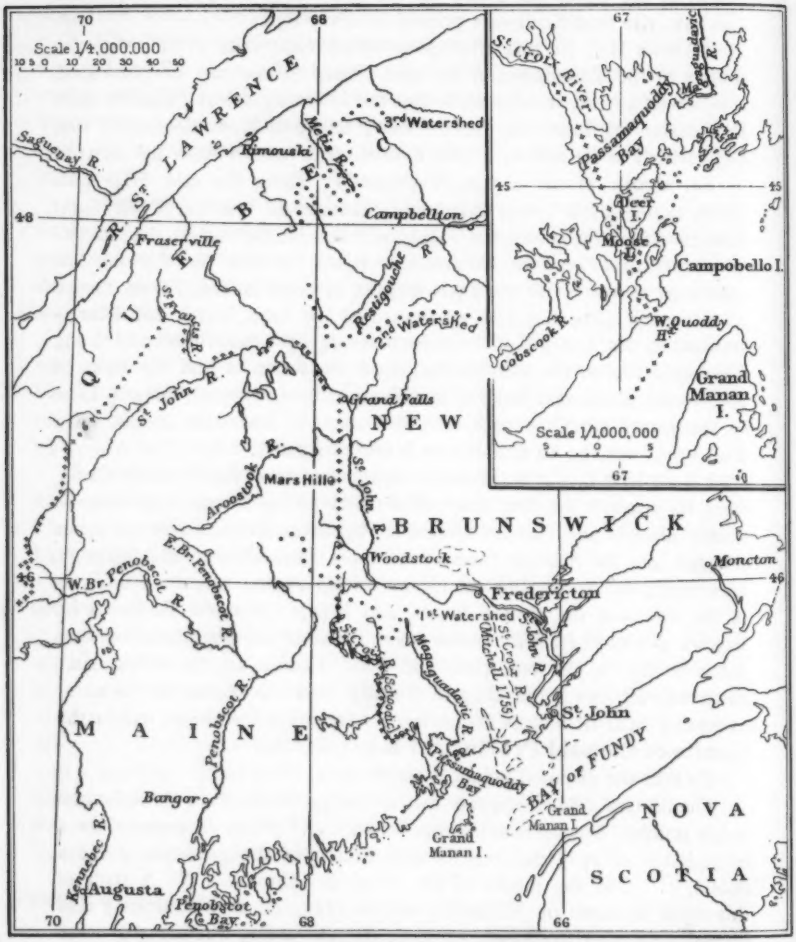
"East, by a line to be drawn along the middle of the River St. Croix, from its **mouth in the Bay of Fundy** to its source, and from its source directly north to the aforesaid Highlands, which divide the rivers that fall into the Atlantic Ocean from those that fall into the River St. Lawrence; comprehending all islands within twenty leagues of any part of the shores of the United States, and **lying between lines to be drawn** due **east** from the points where the aforesaid Boundaries between Nova Scotia on the one part, and East Florida on the other, shall **respectively** touch the **Bay of Fundy and the Atlantic Ocean**; excepting such islands as are now, or have heretofore been, within the **Limits of the said Province of Nova Scotia.**"

To take the disputed points as they arose:

The St. Croix River appears first in the grant of 1621: "Ad fluvium vulgo nomine Sanctae Crucis appellatum . . ." which is repeated in a commission of 1763 defining the jurisdiction of the governor of Nova Scotia, ". . . to the mouth of the River St. Croix. . . ." A river of this name is shown on Mitchell's map of 1755, but so inaccurately that immediately after the treaty of 1783 dispute arose, whether the name St. Croix, which was unknown locally, belonged to the Magaguadavic or the Schoodic, or even the Cobscook. After long negotiations, a joint commission in 1798 decided for the Schoodic, which is now called the St. Croix.

This river has two branches, of which the eastern is the longer. The grant of 1621 took the boundary "ad scaturiginem remotissimam sive

fontem ex occidentali parte ejusdem qui se primum predicto fluvio immiscet" which in the commission of 1763 becomes simply "its source." The commission compromised on the western source of the eastern



CANADA-U.S. BOUNDARY: BAY OF FUNDY

The position of the St. Croix river on Mitchell's map of 1755 shown dotted; and the three watersheds that might be called the Highlands.

branch, and rejected a contention that when a river issues from a lake, its source is the outlet from the lake, and not the furthest head of the lake's feeders.

The grant of 1621 took the line from the source of the St. Croix "northward to the nearest bay, river or stream emptying into the great river of Canada," which in the commission of 1763 became "a line drawn due north from thence to the southern boundary of our Colony of Quebec," and in the treaty of 1783 "a line drawn due north . . . to the Highlands." The variation from northward to due north gave to the United States all the northern part of Maine.

The next question was the meaning of the word "Highlands." The watershed is a high level marshy plateau, but the intersection of the due north line with "the Highlands" made the north-west corner of Nova Scotia by the treaty of 1783, and this was a crucial point. After futile negotiations in 1803, the fifth article of the Treaty of Ghent in 1814 provided for the appointment of two commissioners to survey and mark the boundary from the source of the St. Croix to the St. Lawrence. The first watershed crossed by the due north line divided the basins of the Penobscot, flowing into Penobscot Bay, and the St. John, flowing into the Bay of Fundy; the second watershed divided the basins of the St. John and the Restigouche, flowing into Chaleur Bay on the Gulf of St. Lawrence; the third watershed was that of the Restigouche and the St. Lawrence; and this fitted the definition of the Highlands in the treaty of 1783 only if the Gulf of St. Lawrence was to be considered the Atlantic Ocean.

The commissioners having disagreed, the matter was in 1825 referred to the arbitration of the King of the Netherlands, together with further points in dispute. His award in 1831 decided that neither claim satisfied the treaty, and recommended a line of convenience, which the United States refused to accept. In 1843, however, they agreed to the Ashburton treaty, which gave them less than they were given by the award of 1831.

Meanwhile there had been much difficulty about the islands in the Bay of Fundy. The obscure wording of the Treaty of Paris made the eastern boundary of the United States comprehend "all islands within twenty leagues of any part of the shores of the United States, and lying between lines to be drawn due east from the points where the aforesaid boundaries between Nova Scotia on the one part, and East Florida on the other, shall respectively touch the Bay of Fundy and the Atlantic Ocean; excepting such islands as are now, or heretofore have been, within the limits of the said province of Nova Scotia." At this date Florida was not included in the United States, but had just been given back to Spain by Great Britain. The clause therefore gives to the United States all the islands lying due east of any part of the mainland within twenty leagues, except those belonging to Nova Scotia. The exception was important, since in effect it changed the word "east" into "south" of the point where the boundary touched the Bay of Fundy; but it does not seem necessary to follow Mr. James White in maintaining that east was actually a mistake for south in the definition.

The principal islands in dispute were Deer, Moose, Campobello, and Dudley Islands, which had been administered by Nova Scotia, and Grand Manan, which had been reserved from Nova Scotia, pending another grant. Moose Island was nearly joined to the mainland, the others having navigable channels separating them. The first point which arose was whether the outflow of the St. Croix into Passamaquoddy Bay constituted its mouth in the Bay of Fundy, or whether some channel between the islands must be counted as part of the river St. Croix, so that it could issue in the Bay of Fundy proper. The Commission of 1798 decided in the former sense.

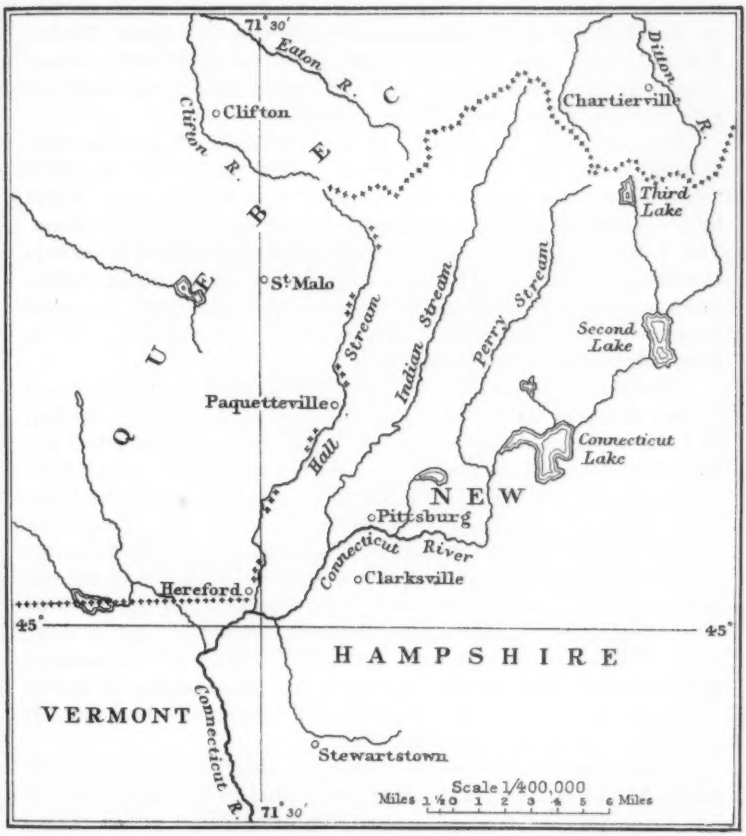
In 1803 it was agreed by the King–Hawkesbury Convention, that the boundary should run by the middle channel between Deer Island on the east and north, and Moose and Campobello Islands on the west and south; and that the islands east and north of the line, together with Campobello Island, should belong to New Brunswick. It is hard to see why the line should have been described as excluding Campobello Island, and that it should then have immediately been included by exception. Neither this, nor a similar agreement drawn in 1807, was ratified.

During the war of 1812–14 Great Britain occupied Moose Island, and by the Treaty of Ghent of 1814 it remained in her possession pending a settlement of the whole question, which was referred to commissioners who in 1817 gave Great Britain Deer, Campobello, and Grand Manan Islands.

In the course of the century difficulties arose over the boundaries in the water channels and in 1892 commissioners were appointed to settle these questions. After agreeing that the line to be drawn should give each nation equal water areas, and should be in a series of straight lines marked with buoys and range-marks on shore, a large part was so marked in 1893; but further disputes remained unsettled until the treaties of 11 April 1908 and 21 May 1910, by which the boundary in the channels was laid down with extraordinary minuteness, in a series of lines of length given to a tenth of a metre, and of azimuths to single seconds of arc. It is not clear whether this line has ever been marked, nor how it is to be done. The whole thing is a warning for the future against taking a boundary among islands whose inter-channels are all territorial waters.

We now return to the highlands and the boundary running westwards "along the said highlands which divide those rivers that empty themselves into the River Saint Lawrence, from those which fall into the Atlantic Ocean, to the north-westernmost head of Connecticut River; thence down the middle of that river, to the 45th degree of north latitude; from thence by a line due west on same latitude, until it strike the River Iroquois or Cataraquy; . . . etc. (Treaty of Paris)." A very curious point arose on the interpretation of these clauses. The north-westernmost tributary of the Connecticut river is the Hall stream, which joins the main stream,

already however called Connecticut, a little north of the 45th parallel, but south of the "old line" erroneously marked as that parallel between 1771 and 1774, for the boundary between New York and Quebec. One might then proceed down the Hall to the Connecticut and down that to the true 45th parallel, but if one stopped and turned west at the "old



CANADA-U.S. BOUNDARY: HALL STREAM

Example of a line wrongly surveyed before the Treaty allowed to stand.

line" one never reached the Connecticut at all. Nevertheless the Hall and the "old line" were conceded to the United States by the Ashburton Treaty, in the process of adjustment. This is a striking instance of a wrongly surveyed line being allowed to stand, even though the error was made before the treaty definition.

From the Iroquois the boundary is carried west along the "middle

of rivers and lakes." The ownership of islands was thus often in dispute. By the Treaty of Ghent, 1814, commissioners were appointed to settle these questions, who agreed that the middle of the stream was the middle point between its banks, and not the thalweg, and that when an island was intersected, it should belong wholly to the Power to whom the larger part of the island fell by the definition. Further, when width allowed, the boundary line should run a hundred yards from the island. Further difficulties arose over navigation rights in the channels; and in recent years there have been disputes over water-power rights. The whole is a good example of the defects of a river boundary.

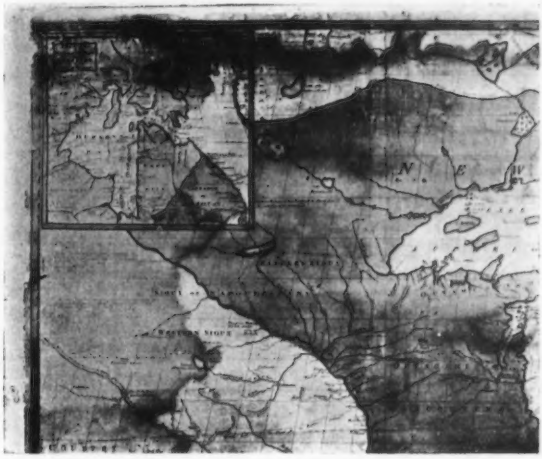
It is noteworthy that although the Great Lakes are much more than 6 miles across, their waters outside a 3-mile limit are not treated as "high seas," but a boundary line is carried right through them, defined by buoys and monuments, or by range marks on the adjacent shores. The Treaty of 11 April 1908 empowered the International Waterways Commission to locate the line, and to substitute for the curved median line a series of connecting straight lines, following generally the course of such curved line; but differences have arisen even over this, and the demarcation is still incomplete.

Difficulties of a much larger order occurred in the interpretation of the last clauses of the Treaty of Paris definition of the western boundary, to Lake of the Woods, for they were based upon geography that was altogether wrong. First, the Isles Royale and Philippeaux of Mitchell's map were one and the same; but as both were assigned by the treaty to the United States, this did not matter much. Secondly, Long Lake could not be identified with certainty, but was assumed by the Ashburton Treaty to be Pigeon Bay. Thirdly, the river shown by Mitchell as draining Lake of the Woods into Lake Superior does not exist; there is no water connection between the two lakes. Fourthly, the northern end of Lake of the Woods is deeply indented, and full of islands; its north-western point is quite indeterminate. Fifthly, and most important of all, the Mississippi rises south of the lake, and no line drawn west from any part of the lake touches the Mississippi at all.

This last mistake was soon discovered, and attempts made to substitute for the parallel a line from the north-west corner to the nearest head of the Mississippi; but this was involved with or conflicted with the vague limits of the Louisiana purchase. The 49th parallel without reference to the Mississippi was then proposed by Great Britain; and it is interesting to note the contention of Mr. White that this was done under the misapprehension that the parallel was the boundary between Hudson's Bay territory and Louisiana, whereas it was really between the former and Canada, then French. Eventually the parallel as far as the Rocky Mountains was agreed by the Convention of 20 October 1818, and by the Oregon Treaty of 1846 was extended to the Pacific coast, "to the middle of the channel which separates the continent from Vancouver Island,

and then southerly through the middle of the said channel and of Fuca's Straits to the Pacific Ocean." There is an archipelago of islands and two main channels between Vancouver and the mainland, and the above carelessness of definition, not naming the channel or showing it on an attached map, led to prolonged dispute settled only by the arbitration of the King of Prussia in 1872, awarding the islands to the United States, and making the Haro Channel next Vancouver Island the boundary.

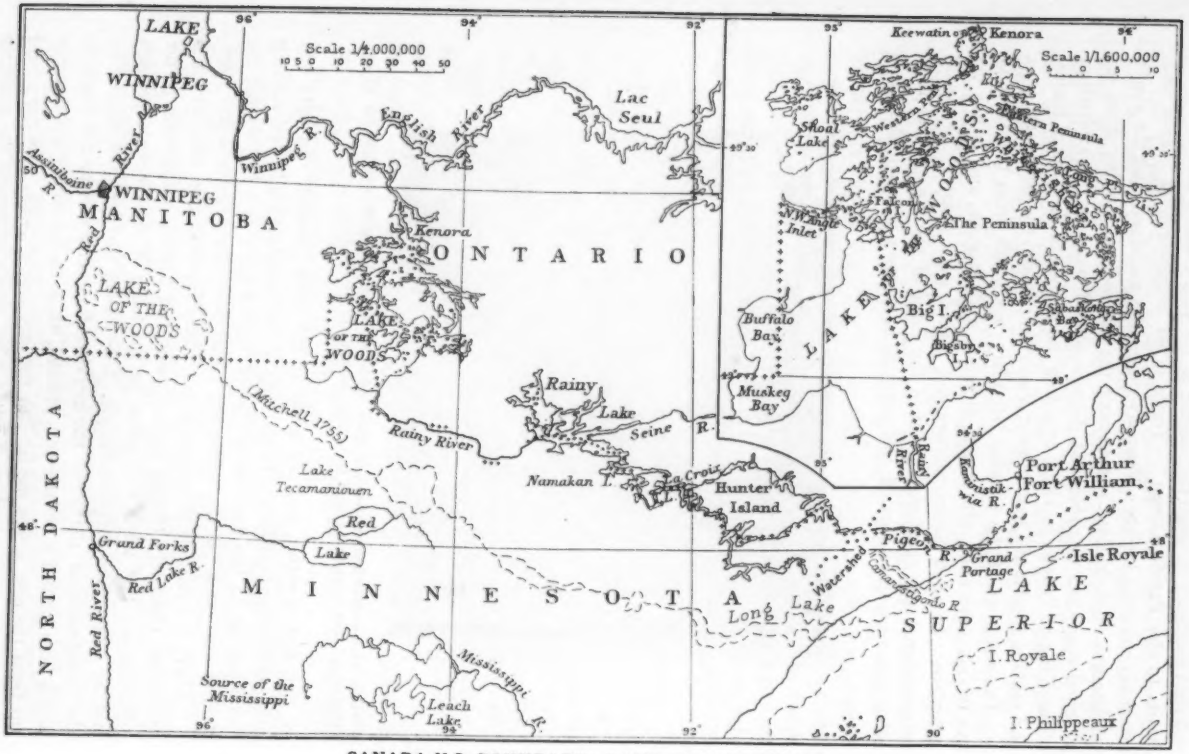
The marking of the parallel boundary westwards from the Lake of the Woods proceeded with much difficulty and expense, and is not yet complete. In 1826 commissioners had agreed on a point which should be considered the north-west point of the Lake of the Woods. In 1872 other commissioners located this point as in a grassy marsh under three



Portion of the Mitchell map: the inset west of Lake of the Woods cutting off the Mississippi, but suggesting that this river rises north of the Lake.

or four feet of water, and cut south to the 49th parallel. In 1912 still other commissioners for the re-marking of the boundary could find nothing but a beacon to the north-west erected by the party of 1872, so that the "north-west point" of the treaty was a bad choice for a fundamental point.

There is a curious thing about the boundary definition here which is somewhat obscurely treated in the many and scattered accounts of the operations. The north-west point of the Lake of the Woods is perhaps not the same as the north-west angle. The former had been determined by the commission of 1826, and the meridian boundary was to run north or south from it until it cut the 49th parallel, while the boundary was to come up from the east across the lake to the north-west point. By agreement it proceeds up the north-west angle inlet, which intersects the meridian



CANADA-U.S. BOUNDARY: LAKE OF THE WOODS

The positions of the principal features from Mitchell's map of 1755 shown dotted.

of the north-west point some little distance south of the point. This intersection makes the north-west angle, whence the meridian boundary runs south; but since the north-west point is also by definition on the boundary, it appears that the United States should possess a short strip comprising the meridian only—a strip of no breadth at all—between the north-west angle and the north-west point. It is perhaps the only case in which the territory of one Power is cut into by a line of no breadth belonging to a neighbour; and its effect should form an interesting question for debate. There is close by another example of the cast-iron interpretation of geometrical boundary treaties that distinguishes so markedly the relations of the United States and Canada. Just south of the north-west angle the Dawson trail from the west came down to a small steamer landing on a creek of the lake, where the subsidized Indians drew their supplies. The meridian boundary cut off the tongue of land where the little port was established; it had to be moved just west of the meridian, and is now approached from the lake through about a mile of United States waters, separating the larger and smaller detached portions of Minnesota left stranded by the meridian boundary on the western shore of the lake.

The parallel west to the summit of the Rocky Mountains was marked by the Commission appointed in 1872. Astronomical latitude was determined about every 20 miles, with a total of forty stations in 860 miles of boundary. Owing to deviations of the vertical the boundary is not a parallel, the greatest discordance between adjacent stations being 7″·98, or about 750 feet near Three Buttes, and the extreme range being 13″·89, or 1407 feet. These figures are from a paper by Otto Klotz in the *Geographical Review* for May 1917, and the differences between astronomical and geodetic latitude are presumably derived from the United States triangulations, with initial latitude at Meades Ranch. They will be to some extent affected in their zero, though very little in their amplitude, by the figure of the Earth adopted in the U.S. calculations (Clarke, 1866). The recent discussion by Hayford ('Isostasy and the Figure of the Earth,' 1909 and 1911, U.S.C.G.S.) does not include enough stations near the boundary to throw much light on this rather delicate question. By agreement between the Commissioners the boundary between pairs of astronomical stations was given the curvature of the parallel, though not usually parallel to the equator. On an arc of 20 miles in this latitude the deviation between a great circle and a parallel amounts to 25 yards at the middle point, so that the quantities are small compared with the irregularities due to deviation of the vertical. They are however systematic, and the adoption of a great circle instead of arc with curvature of parallel would have operated consistently against Canada. In accordance with the treaty of 1908 this boundary is now being remarked, but the maps are not yet published, and no figures as to the cost of the operations, either of 1872 or of the new demarcation, are to be found.

The positions of the principal features from Mitchell's map of 1755 shown dotted.

The cost must, however, be very heavy, as it is stated in the Annual Report of the United States Coast and Geodetic Survey for 1908 that large-scale maps (1 inch to 250 feet) were made to cover a strip 500 feet wide on each side of the boundary during the operations conducted under the treaty of 1908. The reason is apparent when we read that "monuments were established on each side of the principal houses intersected by the boundary," while marks were made on all houses found to be on the line. The international status of the occupants is not defined, but we are informed that, though no new houses may be built within a specified distance of the international boundary, no attempt is made to interfere with those standing on the line when demarcated. They must be valuable property.

The 49th parallel west of the Rocky Mountains to the Pacific coast —the North-West Boundary—was first surveyed and marked by a Joint Commission in 1858–61, with twenty-eight astronomical stations in a

THE 49TH PARALLEL WEST OF THE ROCKY MOUNTAINS

length of 409 miles. The final report was signed in Washington in 1869 in duplicate; but when some years later the country began to be settled, great difficulty was caused by the presence at places of three parallel vistas cut in the forest, and two series of boundary monuments. On inquiries being made at Washington and Ottawa, neither side could a few years later produce the final report of their Commissioners, both copies being lost. The Canadian copy was at last in 1898 discovered in the library of the Royal Observatory at Greenwich, and has since been published in *Foreign Office Correspondence*, III. and IV., Ottawa, 1899. It then appeared that between the Similkameen and the Columbia the deviations of the vertical were so considerable and so rapidly variable, giving in one instance a discrepancy of 8″ in a length of 9 miles, that vistas cut east and west from adjacent stations failed to meet by large amounts, and eventually a mean parallel was adopted, monumented, and cut; but an earlier line of monuments was not removed, hence the three vistas and two lines of monuments.

The parallel west of the Rockies differs from that east of them in two respects: a large section of it is a mean parallel, while the rest is defined by great circles connecting the astronomical stations, instead of by arcs having the curvature of the parallel. In a letter to the Foreign Office at the close of the operations, the British Commissioner explained that he had agreed to this "that nothing should be left for future discussion or settlement and that our operations should be final and conclusive." But he said nothing about the three vistas and the two lines of monuments; and the subsequent disappearance of both copies of the report makes the incident unique in boundary history.

The maps of this portion of the boundary, west of the Rockies have recently been issued by the U.S. Geological Survey.

NOTES ON A VISIT TO LAKE CHAD

P. H. Lamb, Director of Agriculture, Northern Provinces, Nigeria

THOUGH Lake Chad was visited by British travellers from Tripoli over a hundred years ago, long before any white man had set eyes on Lake Victoria Nyanza, it nevertheless remains, even to-day, comparatively little known. It is, however, not nearly so difficult of access as it was a few years ago. The traveller can reach Lagos by sea from Liverpool in seventeen days. From Lagos to Kano, 700 miles, is covered by rail in forty-eight hours, and the journey from Kano to within 15 miles of Chad, about 400 miles, can now be done by motor car in four days during the dry season. The last lap of 15 miles lies through sand, but ponies are plentiful and can easily be hired as required. In this way the writer reached Chad in January last. At this time of year the climate is at its best, for, though the days may be hot, the nights are invariably cool while the Harmattan wind is blowing.

From Kano, the terminus of the railway, the route lies almost due east to Maiduguri, the capital of Bornu. The country is for the most part flat or gently undulating. There are no serious obstacles to be surmounted. A few rivers are negotiated by fords, temporary bridges, or in one case by a causeway of matting laid down over the dry sandy bed. The road is a clearing through the bush. The surface varies, being metalled with laterite for considerable lengths, but in other parts the natural earth is levelled with a hoe and serves tolerably well for light traffic. It is generally possible to average 15 miles per hour on a day's run. In one light Ford lorry I was able to take two servants and ten loads of fifty pounds each in addition to a native driver. The body of the lorry was of the lightest possible make, fitted with a hood of native matting for protection from the sun. A most important point is that the

wheels on either side should clear the body of the lorry by at least 4 inches.

From Maiduguri, which is 80 miles from Lake Chad, the road strikes north as far as Kukawa and thence to Kouwa, where we left the lorry. The sand dunes between Kouwa and Chad are covered with a shrub called in Hausa "tumfafia" (*Calotropis procera*). Here and there are depressions containing black soil, which are filled with water during the rains, but during the dry season are devoted to the cultivation of winter crops, such as onions and wheat, by irrigation. The water was being lifted from wells, some 15 to 20 feet deep, by *shadufs*. Besides wheat and onions there were also to be seen in these gardens, cotton, aniseed, sweet melon, cucumber, pumpkin, and garden eggs.

Passing through this sandy belt, which contains numerous small Beri-Beri settlements, one suddenly comes upon the flood-level of Chad, and away as far as the eye can reach is apparently one huge reed bed, broken here and there by tracts of open water. Bordering the lake is a dense growth of a wild species of sorghum. It is gathered and eaten by the people in years of scarcity, but at the time of my visit was affording food for countless numbers of finches—evidently migrants. In places the natives were working knee-deep in water, clearing away this heavy undergrowth so as to be in readiness to sow their crops so soon as the land should be dry enough. In view of the fact that Chad is an inland lake into which several rivers empty themselves, but from which there is no apparent outflow, one would naturally have expected the water to be brackish or even strongly impregnated with salts of various kinds as is the Dead Sea. This however is not so, for the water is notoriously sweeter than any of the well water in the surrounding neighbourhood. Colonel Tilho explains this by inferring that Chad must have a subterranean outlet. To me it would appear that no such assumption is necessary. The sweetness of the water may surely be attributed to the enormous growth of aquatic vegetation which Chad supports. The plants require for their growth the salts brought down by the rivers in dilute solution. The salts thus combined with organic matter will ultimately be deposited in the form of peat or humus. It is to such humus that the remarkable fertility of the foreshore no doubt owes its origin. The immense evaporation from the Chad basin, estimated during the dry season at 10 inches per month, is all-sufficient to account for the disposal of the water.

Chad cultivation is to be seen to perfection on the south-western side of the lake around the village of Kalkala. Here a large area of fertile foreshore is cultivated by a number of peasant proprietors. The conditions reminded me forcibly of Egypt. Owing to the fact that the land is cultivated annually there is no heavy clearing to be done, but the soil is lightly scratched with a hoe and the seed sown as soon as the water recedes. The annual inundation of Chad takes place at the end of the

rainy season, and is caused by the rivers on the south-west side emptying their waters in flood against a mass of vegetation growing in the shallow waters of the lake. This holding up of the water to the south is accentuated by the strong Harmattan wind which at this season of the year blows continuously from the north-east. The heading up of water by the wind is a well-known phenomenon in the shallow lakes of Egypt and elsewhere. As soon as the Harmattan begins to drop and the floods subside, the waters of Chad begin to recede. At the time of my visit, towards the end of January, the foreshore presented a scene of great activity. While sowing was in full swing, other crops close by were being harvested. These had been grown on the flats flooded by the Urge river in September.

It was here that I first realized that large areas to the south and south-west of Chad are deltaic. The rivers Yedseram and Ulge, as they approach Chad, divide into a perfect network of mouths and deposit their silt. There are thus in the Chad region five distinct types of cultivation, which may be classified as follows:

(1) By rainfall	Planting season,	June–Sept.
(2) In dried swamps (*tapki*)	,,	Oct.–Nov.
(3) Upon riparian lands	,,	Oct.–Nov.
(4) By lift irrigation from wells	,,	Dec.–Jan.
(5) By basin irrigation on Chad shore	,,	Jan.–Feb.

In the region between Dikwa and the lake are vast areas of the second type of cultivation. The crop so grown is a kind of guinea-corn with a closely packed pannicle known locally as "massakwa" (*Sorghum cernum*). Its cultivation is so specialized as to be worth recording. The seed is sown in seed-beds, well above flood-level, towards the end of the rainy season. As soon as the floods subside from the black cotton-soil flats, holes are made in the mud some 6 inches deep with a blunt dibble, from 3 to 4 feet apart in each direction. The seedlings are then transplanted. Two plants are placed in each hole, and a little water (but no soil) is added by hand to assist the seedlings to root. For the rest they rely entirely on subsoil water, and ripen their crop within ninety days of transplanting. The area devoted to this crop in the neighbourhood of Chad must this year have run into hundreds of square miles, and even so the population seems to be insufficient to make full use of the enormous area of these deltaic flats. The people informed me that in years of plenty they bury their grain in stores dug out several feet below ground-level. A roof of puddled clay is built over the whole, and an ant-proof course of fine chaff and other materials is placed all round. In this way they are able to store their grain for as long as seven years. When prices warrant it this corn is carried to Maiduguri, a distance of 60 miles, for sale.

The boundary between British and French territory at the south end

of Chad is the river Libet, which is full of fish and supports a fish-drying industry of considerable importance. Though 700 miles from the sea, this spot is frequented by large numbers of grey-headed gulls (*Larus cirrhocephalus*). It is not clear whether these birds nest in the neighbourhood or are only migratory. A brisk trade in natron is carried on between French and British territory across Lake Chad. The natron is prepared in blocks weighing about forty-eight pounds each, from alkaline deposits in French territory. It is transported across the lake on rafts of reeds which serve the purpose of canoes. The life of one of these canoe-rafts is said to be less than a month. After this they become sodden and are no longer buoyant. When new, a large raft of this description will carry two tons or more of natron. These blocks of natron (consisting of a mixture of sodium carbonate and sodium bicarbonate) are worth one shilling each at Chad, but are sold at fifteen shillings in distant parts of Nigeria owing to the high cost of transport. Stock-owners throughout the country use this natron in place of rock-salt for cattle.

Though Chad is at present far removed from railway communication, it is none the less an important trading centre for native merchandise. Several schemes have been suggested by the French as well as by ourselves for linking it up by rail with the outside world, and when one of these eventuates the results are likely to surprise those not familiar with the great potentialities of these regions.

THE MOUNT EVEREST EXPEDITION

AT the meeting of the Society on Monday, November 7, the President made the following statement:

The Mount Everest Expedition of the present year has accomplished its object. After persistently probing round the mountain in many different directions, Messrs. Mallory and Bullock have succeeded in reaching a point on one of its buttress ridges from which the way to the summit seems reasonably practicable. This point is on the north-eastern arête, and is some 6000 feet below the summit. The climbers are satisfied that from there the summit may be reached without meeting any insuperable difficulty from the actual configuration of the mountain.

In addition to this main result, the Indian Survey Officers, Major Morshead and Captain Wheeler, have surveyed 13,000 square miles, mostly of unknown country, and have made a detailed photographic survey of the whole Everest group. Mr. Wollaston has made valuable and interesting collections of the plants, birds, animals, and insects. Dr. Heron has made a geological survey of the region between Mount Everest and the Brahmaputra. And Colonel Howard-

Bury has sent home a series of despatches and photographs which reveals to the world combined mountain and forest beauty of a grandeur nowhere surpassed, and which from now onward will be available for the perpetual enjoyment of mankind.

All this has been accomplished at a cost—excluding what the Government of India may have expended in Survey—of about £5000.

For these satisfactory results we are mainly indebted to the fine leadership of Colonel Howard-Bury. But about that and about the conduct of the other members of the Expedition I shall have more to say when we welcome them back in the Queen's Hall on December 20. I wish, however, on behalf of the Royal Geographical Society and the Alpine Club here at once to acknowledge with great gratitude the support the Expedition has received both from the Government of India and from the Tibetan authorities. Lord Chelmsford, Lord Reading, Lord Rawlinson, and Lord Ronaldshay have all lent the Expedition their keenest support; and from Colonel Ryder, the Surveyor-General, and from Mr. Bell at Lhasa they have received the greatest assistance. Most satisfactory of all, the Tibetan officials and people have thoroughly been friendly and helpful, and Colonel Howard-Bury in his final dispatch says that the Tibetans were quite sorry the Expedition was leaving.

All this is well enough. But it is only the first step. The real tussle is to come. We have ascertained that there is a way up. But we have now to find men who can, when exhausted by the increasing rarity of the atmosphere, stand the terrific blizzards and the frightful cold which they will encounter on those crucial 2 miles of knife-edge ridge. Endurance and determination in the extreme will be required. But all we can do by careful staff-work and by making use of all the experience available to help the climbers we will do.

We shall have to reorganize the Expedition for its final object and find a new leader, for Colonel Howard-Bury has been away for two successive years and his home in Ireland needs his attention. Besides the chief of the Expedition, we shall want six men for the climbing party. And we are advised that May and June are the best months for climbing Everest, so the Expedition will have to leave Darjeeling about March 21. Some members of this year's expedition will, we hope, be able to go out again, and we are gratified to hear that most of those Himalayan coolies who were specially enlisted for this year's work have already volunteered to join next year's party.

The Chairmanship of the Mount Everest Committee should now have devolved upon the President of the Alpine Club. But Prof. Norman Collie and the other members of the Committee have been good enough to invite me to retain the Chairmanship in view of my special knowledge of local conditions. I take this opportunity of

acknowledging their great courtesy and kindness, and of assuring both the Alpine Club and this Society that I will do all in my power to assist in the successful achievement of the great object we all have before us.

At the Meeting on November 21 the President announced that Brig.-General the Hon. C. G. Bruce had been appointed to lead the second expedition.

The photographs of the Kama valley and country east of Mount Everest did not arrive in time to allow preparation of more than a few half-tone blocks to illustrate the narrative of the expedition compiled from cablegrams for the November *Journal*. But in the present number we are able to give a further series of photogravures from the rich collection of pictures made by Colonel Howard-Bury and other photographers of the party; and a wonderful batch of negatives that arrived by the Indian mail of November 7 will require another.

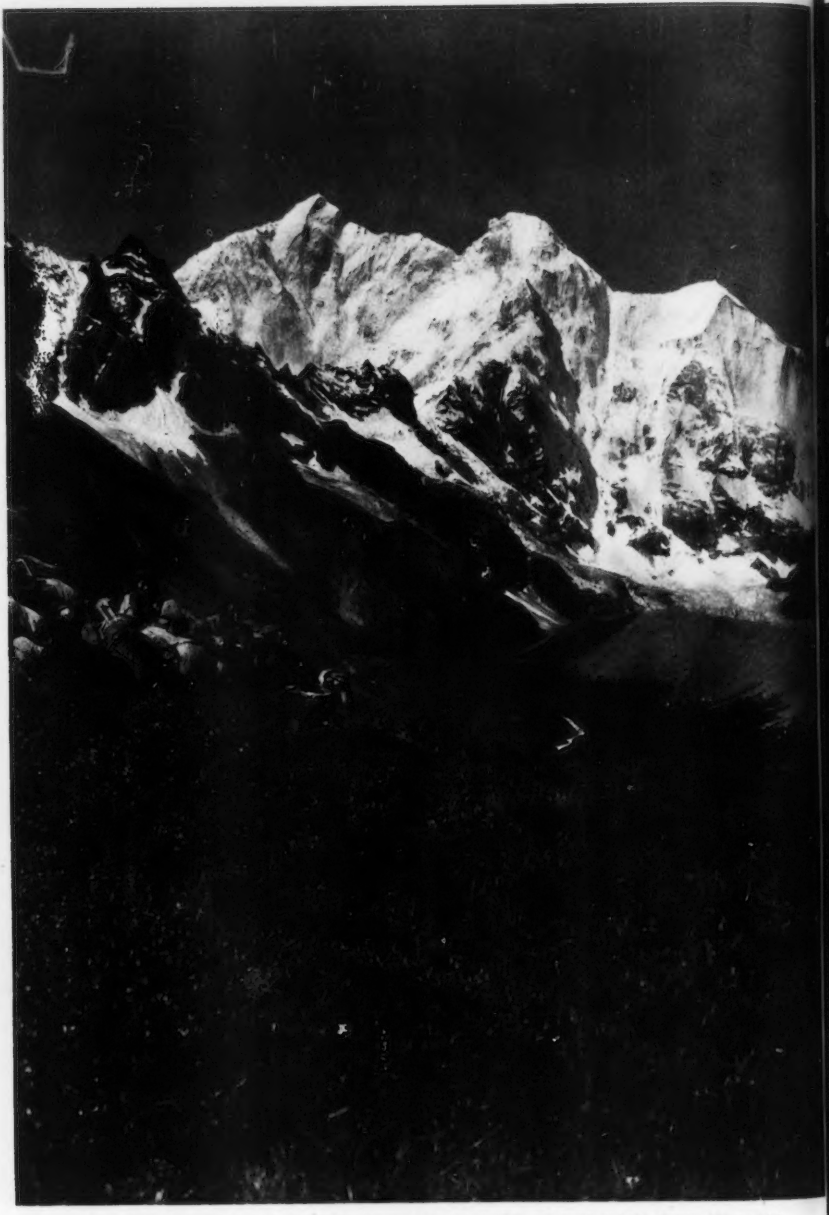
The great difference between the country east and west of the mountain is well shown in the panorama made by Captain Wheeler (No. 10) from the southern slopes of peak 25,990, looking across the long West Rongbuk glacier that comes down from a glacier pass of 19,000 feet on the Nepal border somewhere east of the Khombu pass. The valleys here are high and glacier filled; the principal faces of the mountain are great triangular planes of rock, singularly alike in their structure and disposition: compare the north face of Mount Everest, the west face of the North Peak AA, and the gable ends of the north-western (AD) and western ridges. This arrangement of triangular faces is continued in the great inclined plane between the two branches of the north-east arête, and repeated on a smaller scale in the facet cutting off the eastern branch above the col overlooking the Kama valley. The eastern face (No. 8) and the long south-eastern ridge ending in the great cirque (No. 7) are less severe in their beauty, though quite as formidable to the climber. Not the slightest hint of Dr. Heron's geological results has reached us, and it is not known whether he has been able to get at the lower slopes of the mountain itself.

The East Rongbuk glacier, which has played so elusive a part, lies behind the ridge on the left of Captain Wheeler's panorama, more or less parallel to the Main, and at right angles to the West Rongbuk. It seems to be so completely separate from the other two that it deserves a separate name, worthy of its importance in the problem. Further reflection and study of the photographs just arrived confirm the opinion expressed last month, that the critical question for next year is to decide whether to gain the head of this glacier by the known route of the Kharta valley and over the Lhakpa La, or to try first the straightforward ascent from the Rongbuk valley that was unfortunately never attempted this year owing to the break of the monsoon in early July.

1. LOOKING NORTH UP THE ARUN VALLEY FROM ABOVE BASE CAMP AT KHARTA

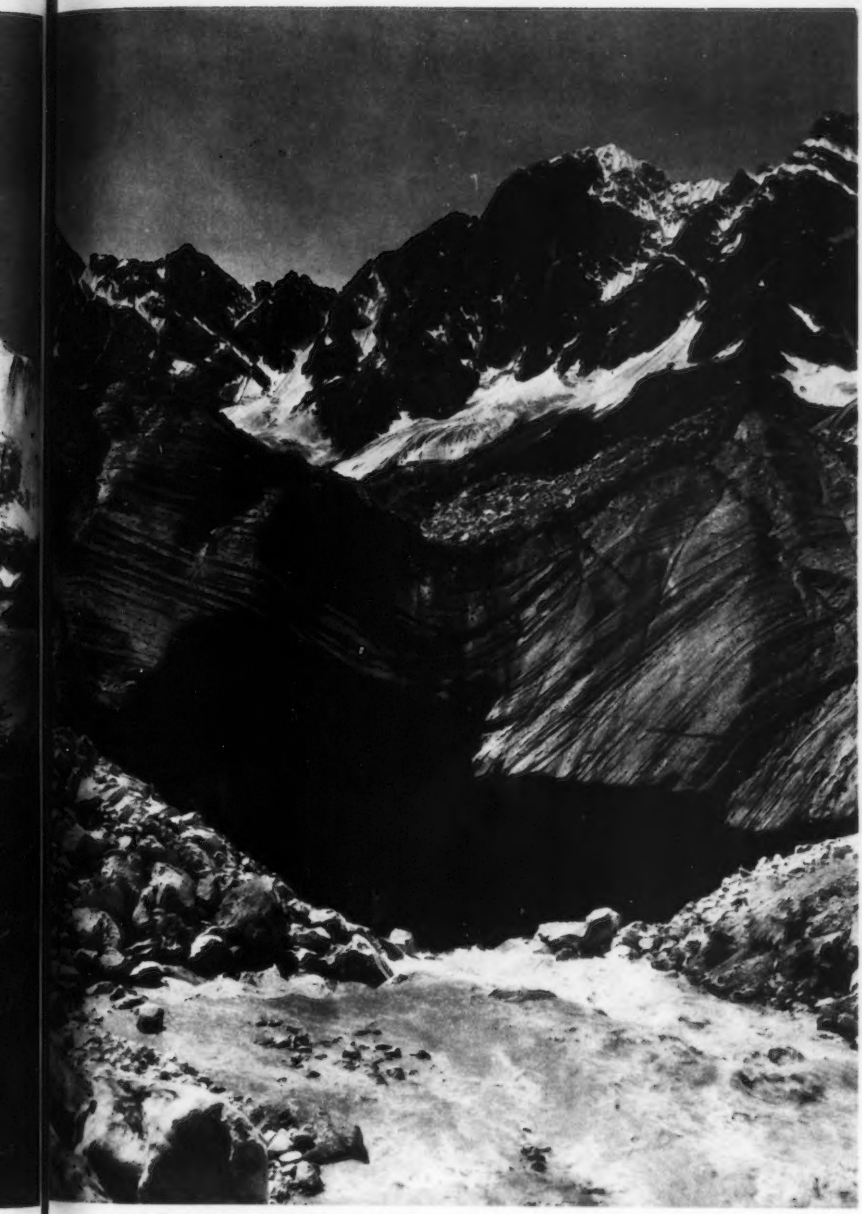
2. HOUSE AND CAMP AT KHARTA: THE SECOND BASE OF THE EXPEDITION

Phot. by Col. Howard-Bury, D.S.O.



3. THE CLIFFS OF N53 FROM PETHANG, VALLEY OF THE KAMA CHU, AT 14,500 FEET

Phot. by Col. Howard-Bury, D.S.O.

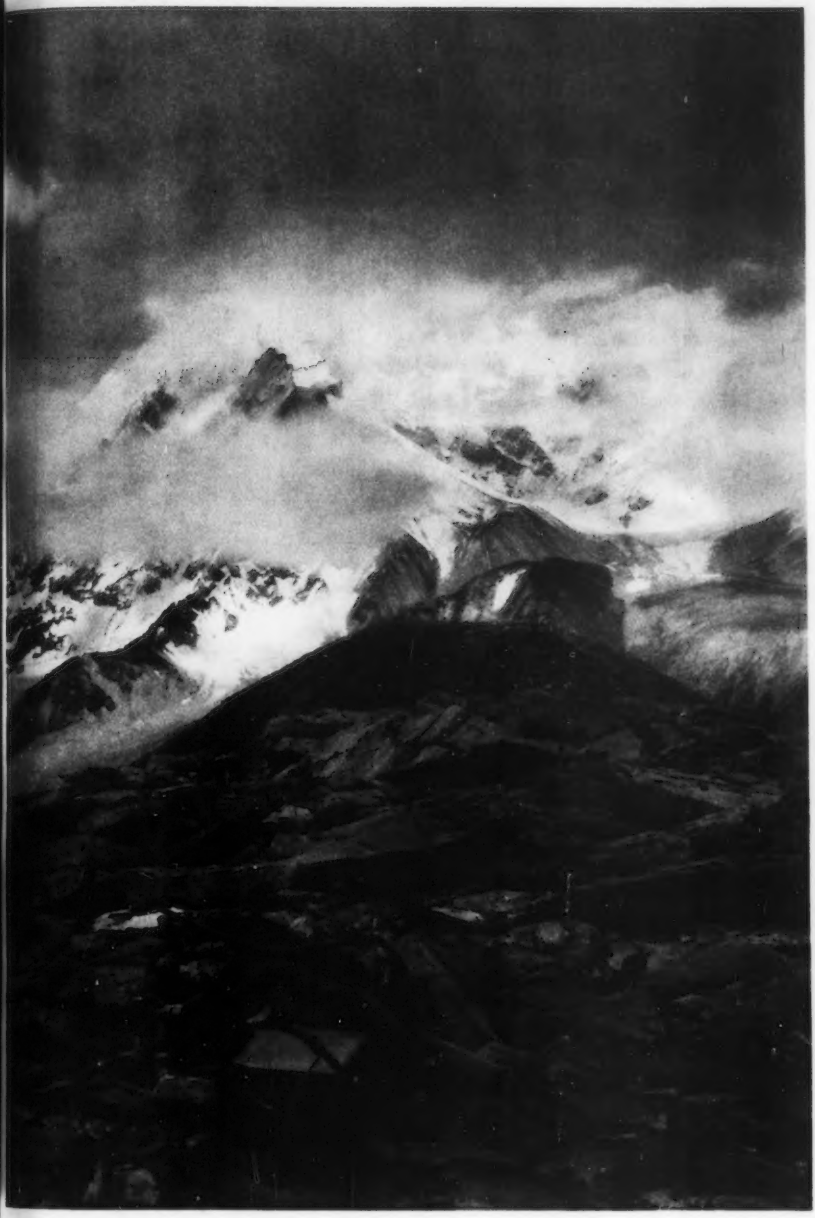


4. THE GLACIER CAVERN BY WHICH THE KAMA CHU PASSES UNDER THE KANGDOSHANG GLACIER BELOW THE CLIFFS OF N 53

Phot. by Col. Howard-Bury, D.S.O

5. THE CAMP AT PETHANG RINGMO AT 16,400 FEET IN THE KAMA VALLEY BELOW THE CLIFFS OF N 53

Phot. by Col. Howard-Bury, D.S.O.



6. THE SUMMIT OF MAKALU AND THE CLIFFS OF N53 FROM 19,600 FEET NEAR THE HEAD OF THE KAMA VALLEY

Phot. by Col. Howard-Bury, D.S.O.

EB EC ED EE

7. THE CIRQUE AT THE END OF THE SOUTH-EAST RIDGE OF MOUNT EVEREST FROM ABOUT 20,500 FEET

The snow peak in foreground climbed by Mallory and Bullock on August 7th

Phot. by G. L. Mallory

EC ED EE Summit EG

8. TELEPHOTOGRAPH OF THE EASTERN FACE OF MOUNT EVEREST AT HEAD OF KAMA VALLEY

Phot. by G. L. Mallory

N 53 Makalu

9. N 53 AND MAKALU FROM 20,400 FEET ABOVE KHARTA GLACIER

Phot. by A. F. R. Wollaston

10. THE NORTHERN AND WESTERN FACES OF MOUNT

11. TH

Peak
AD End of W. Ridge 24,000 Pk.

MOUNT EVEREST FROM A POINT AT 20,000 FEET ON THE SOUTHERN SLOPES OF PEAK 25,990, LOOKINGACI

EB EC ED Mt. Everest

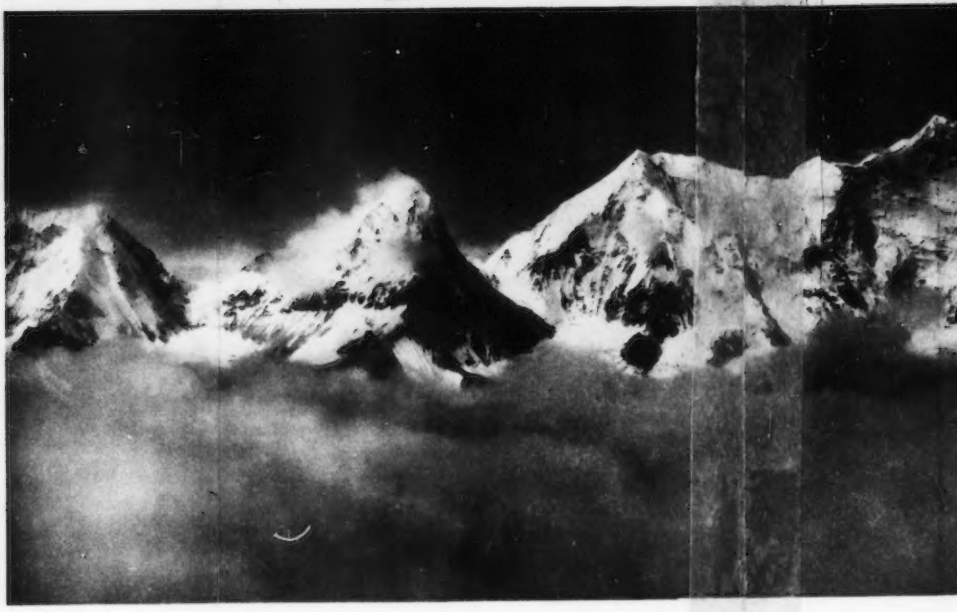
11. THE VALLEY OF THE KAMA CHU FROM ABOUT 16,000 FEET BELOW THE LANGMA LA

OOKINCACROSS THE WEST RONGBUK GLACIER

Phot. by Capt. Wheeler, R.

Phot. by Col. Howard-Bury, D.S.O.

EA EB E ED



13. MOUNT EVEREST FROM NEARLY THE SAME POINT WITH VALLEY CLEAR, BUT PEAKS MOSTLY OBSCURED BY CLOUD

Phot. by
Col. Howard-Bury, D.S.O.

ED EE Summit EG EH AA F

Summit

12. MOUNT EVEREST FROM ABOUT 19,600 NEAR THE HEAD OF THE KAMA CHU, LOOKING ACROSS THE KANGSHUNG GLACIER OBSCURED BY CLOUDS IN THE VALLEY

Phot. by
Col. Howard-Bury, D.S.O.

Mt. Everest 23,800

14. MOUNT EVEREST AND PEAK 23,800 FROM THE ADVANCED BASE CAMP AT 17,000 IN THE KHARTA VALLEY

ED EE Mt. Everest

15. THE FOOT OF THE KHARTA GLACIER AT 19,000 FEET

EC ED EE Mt. Everest

16. THE CAMP AT 20,000 FEET ABOVE THE KHARTA GLACIER
Snow Peak 20,500 in foreground climbed by Mallory and Bullock on August 7th
The arête on the extreme right of the picture is the route to the summit of Mount Everest

Phots. by A. F. R. Wollaston

17. SILVER FIRS IN THE VALLEY OF THE KAMA CHU

18. JUNIPERS IN THE VALLEY OF THE KAMA CHU

Photo. by Col. Howard-Bury, D.S.O.

19. THE RAPIDS IN THE LOWER VALLEY OF THE KAMA CHU

20. THE JUNCTION OF THE KAMA CHU WITH THE ARUN BELOW LUNGDÖ AT ABOUT 7,500 FEET

Photo. by Col. Howard-Bury, D.S.O.

21. VALLEY OF LAKES BEYOND THE SAMJUN LA, LOOKING SOUTH TO THE CHOG LA

22. LOOKING SOUTH FROM THE CHOG LA TO THE 24,000 FOOT PEAKS ON THE NEPAL BORDER

23. THE ARUN VALLEY FROM NEAR THE SUMMIT OF THE SAMJUN LA

Photo. by A. F. R. Wollaston

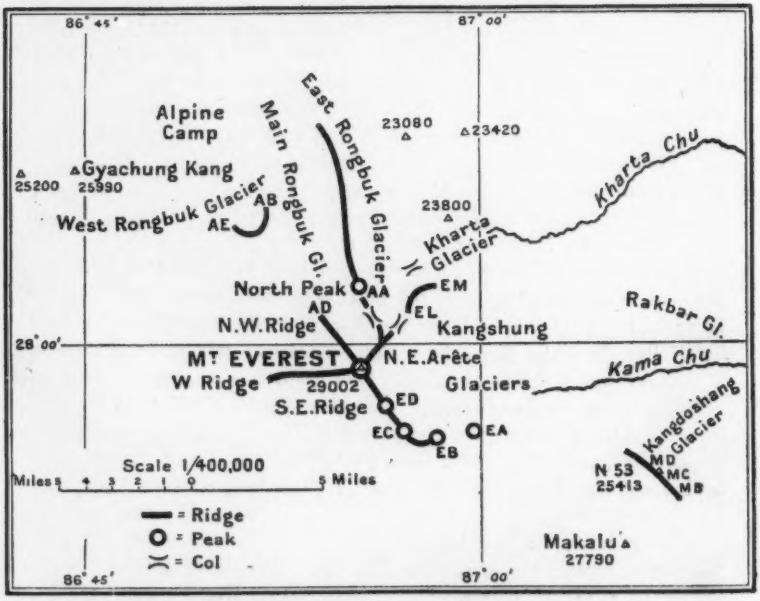
The principal cause of the difference between the inhospitable west and the relatively inviting east of the Kama valley is presumably the great rift of the Arun valley, through which the monsoon works up to within a mile or two of Kharta. One may judge from photographs 1 and 2 that the pleasant site of the second base, on a wide river terrace high above the Arun, is just on the border-line between the arid plateau and the steaming valleys. Colonel Howard-Bury has described how the rain came up all through August to within a mile or two of the camp but seldom reached it. Just below the camp the great gorge begins, and only 15 miles further down horizontally—but about 5000 feet vertically—is the junction of the Kama Chu seen as a great swirl of whiter water in the centre of No. 20. The rapids in the lower valley of the Kama Chu (No. 19) must have the extreme slope of about 5°, or steeper than what is reckoned a steep hill on English roads. The forests of juniper and the silver firs (Nos. 17 and 18) lie some way down the river from the gorge whose beginning is seen on the left of Plate 11. The broad upper valley is bordered by an "alp" on its northern side, from which the cliffs of N 53 are photographed in Nos. 3 and 5. The glacier cavern of No. 4 is photographed from a point just above the Kangdoshang glacier which crosses the valley in the centre of No. 11.

In the *Journal* for November we discussed and failed to solve the problem, What has become of the great rock peak seen to the right of N 53 in the photographs taken by Sella from the Chunjerma La and by Kellas from the Kang La. Some negatives just received suggest a solution which shows excellently how easily one may be deceived in studying mountain photographs. The missing peak is MC! We argued from the rules of perspective that MB, MC, and MD must be nearly in a straight line, and taking these three as buttresses of the mountain mass behind, calculated that from the Kang La one looked nearly along that line.

Now on his return from the high camp of September Colonel Howard-Bury went down by a snow-pass into the Kama valley and across the glacier to a saddle somewhere between Mount Everest and Makalu, whence he photographed N 53 from the other side. This seems to show that the face by now familiar to us, MB, MC, and MD, is not the buttressed side of a great mountain mass, but an irregular edge with cliffs on the other side as steep or steeper. If MC is thin, with nothing behind it, there is no reason why it should not be seen from the Kang La standing out a little in advance of MB, as Dr. Kellas' photograph shows. What we had taken for a solid house was only a front wall, and the missing peak stands boldly in the middle of the picture from which we had argued its absence. That, at least, is the solution which now seems fairly obvious. One might have guessed as much from No. 6, if the clouds had not concealed the critical feature MC.

When Colonel Howard-Bury was first at the head of the Kama

valley and took the photographs here reproduced in Nos. 12 and 13, he was never free from clouds, and we have no complete picture of the scene. Happily, however, there is a narrow zone above or below the clouds, as the case may be, common to the two pictures, and one can be used to supplement the other. They are taken from nearly, but not quite, the same point. On the plateau north of the mountain is a confusion of small peaks difficult to identify. AA is the "north peak" beyond the head of the East Rongbuk glacier; EL and EM are the extremities of a great cirque clearly photographed by Dr. Kellas from the Kang La, 90 miles away. EN is perhaps the snow peak 20,500



Rough diagram to illustrate the presumed topography of the Mount Everest group.

climbed by Mallory and Bullock on August 7, seen in Nos. 7 and 16. EP is apparently the triangulated peak 23,800, called for description the "Kharta Peak," seen in No. 14. The conjectural diagram used in the November *Journal* is here reproduced, for want of better. Later photographs confirm its rough accuracy, except that the fork of the north-east arête should be placed rather nearer the summit; and that, from Mr. Mallory's report, the west ridge starts from a point south of the summit, near the secondary peak of about 28,000 feet which he calls the "south peak" and which seems to be EE or perhaps ED.

Mr. Wollaston's pictures, Nos. 14–16, were the first to show the Kharta valley route. The advanced base in No. 14 seems to be under light

snow, and was not, to judge from the telegrams, always the cheerless place it looks here. One notes that the snout of the Kharta glacier is at 19,000 feet, much higher than those of the glaciers in adjacent valleys, and this may partly account for the choice of this route, which leads across below the snout at 19,000 feet (No. 15), and up the left bank of the glacier to the camp on bare ground at 20,000 feet: the "homelike" camp to which the party retreated when they were driven off the mountain by the blizzard. Much more complete pictures of this region, including the Lhakpa La, the head of the East Rongbuk glacier, and the col between AA and the arête, have now been received, and will be on view in the Society's house and at the Alpine Club.

The last three pictures illustrate the lake district in the country between Kharta and the lower Kama valley, briefly described in the last number of the *Journal* from Colonel Howard-Bury's cablegrams.

While members of this year's expedition are yet in Darjeeling on their way home, the Mount Everest Committee have been actively organizing the second year's work, and it is already decided that the expedition must leave Darjeeling not later than March 21, two months earlier than this year. Colonel Howard-Bury has reported that they are all of opinion that May and June, before the monsoon breaks, are likely to be the most favourable months for climbing the mountain, and that this year the expedition got to work too late. That was no fault of the organizers, who received the approval of the Government of India and the leave of the Dalai Lama only at the beginning of January. But the fact remains that this year the mountains were calm and clear while the expedition was on the march from Kampa Dzong to Tingri, and that bad weather set in only a fortnight after the reconnaissance approached the mountain: bad weather that persisted right up to the end of September when the onset of winter drove them from the field. The year 1921 may have been abnormal in the Himalaya as it has been in London: and the weather-experience of one year is not much guide to the next, since the only safe principle in applied meteorology seems to be that the weather is always abnormal. But in the critical second year the Committee must leave nothing to chance, and they are therefore preparing for a grand assault upon the mountain in May and June. It will involve a cold journey into Tibet: but there is no reason to fear any serious difficulty on that account, since comparatively little snow lies on the plateau, and the country is not so impassable even in the depths of winter as it has proved this year in the summer floods.

The Committee have learned with great regret that the distinguished chief of this year's expedition cannot return to Tibet next year. Colonel Howard-Bury has given two years in succession to the cause, and finds it impossible to spare a third. His able conduct of the negotiations in India in 1920 opened the way at the last moment when

it seemed definitely closed; and this year's success in the field owes everything to his skilful leadership and tremendously hard work. Rarely has an expedition added so much to geography in so few months and at so relatively small an expense; never, perhaps, has so important an undertaking been carried through within the estimated cost. When the accounts for this year are made up on the return of the expedition it seems likely that the position will be as follows. The subscriptions to the funds of the expedition for 1921 amounted to about £5600. All the expenses of this year being paid, it is probable that several hundred pounds will remain for next. Meanwhile, by the sale of the long telegrams from the expedition, and of a selection of the photographs more than £3000 will have been obtained. Arrangements have been concluded for the publication of a book in the early spring of 1922 with an account of the first year's work. From all these sources the Committee have in sight, by the time next year's party takes the field, a sum of between £4000 and £5000. The financial position of the undertaking is therefore remarkably sound; and the Committee can appeal with confidence for such further subscriptions from sympathizers with the great adventure as will allow them to make ample preparations for the second year—the culminating year, as they hope, of the enterprise.

Their first anxiety will be to choose a very strong climbing party. This year's reconnaissance has shown that the approach to the northern branch of the north-east arête is not too difficult; and the arête itself looks quite possible: but it is long and steep, windswept, and inhospitable, showing no very obvious shelter between 23,000 feet and 26,000 feet. Evidently it will be a tremendous task to establish a camp anywhere above the col. The Committee propose to equip a climbing party of six, with the intent that natural selection should operate in finding the three or four best fitted for the last stages of the ascent. Endurance and power of resisting cold will probably count for as much as skill in the refinements of mountaineering; and much will depend on a knowledge of how to make a comfortable camp in the worst possible conditions. For these reasons the Committee will try to secure that one at least of the party shall have polar experience.

The neighbourhood of the mountain has proved to be so much more interesting than it might have been, that there is full scope for as strong a staff of specialists as can be got together. Colonel Howard-Bury and Mr. Wollaston have secured great collections of flowers and seeds already: and the fauna, if not so rich as the flora, seems to be quite extensive, including the bear that masquerades as an "abominable snow-man." Full provision must be made for completing these natural history collections. We can hardly expect that Dr. Heron will have worked out the whole of the geology: in spite of Colonel Howard-Bury's hard work and wonderful success in photography this season, he has himself recommended that a photographic officer shall be sent next year to give his whole time to this

branch of the expedition's work. There is evidently full opportunity for a specialist in glaciology. The monsoon phenomena described in the chief's cablegrams are so significant that official meteorologists may see reason to revise the rather discouraging opinions they expressed when they were consulted last spring. Geodesists will naturally expect that every effort will be made to study the deflections of the vertical north of the Himalaya, and to swing geodetic pendulums as high as possible. Finally, it will be a thousand pities if an artist of the first rank cannot record the colour of the country, which is so glorious even in black and white.

There are also important questions of material equipment. The expedition has been this year at least three weeks away from the telegraph. Wireless communication between the separate parties and with the outer world would have been convenient this year, and may be more essential next, with its much longer season in the field. Again, this year communication and supplies were much delayed by floods, and it was believed that the only way to get to Kharta at midsummer was to go all the way round by Tingri. If light bridging material or a cable transporter could be provided for next year, it might very much facilitate an early arrival at the base. But all this would cost a great deal of money, and much will depend upon the support to be given by generous subscribers within the next few weeks.

It may be useful, then, to explain rather more fully the principles upon which the expedition has been financed. The foundation of success was the resolution that the value of any results should not be anticipated: there has been no mortgaging of the proceeds. No engagements were made for the sale of any reports, or of any photographs until the fund raised by subscription gave an assurance of providing for the whole expenses of the first year. When this position was secured, the committee were able in their own time to arrange for the sale of cablegrams and pictures, with all copyrights reserved to the Committee, and therefore with control of the various parts as components of one considered scheme of publication: the cablegrams for immediate news: the photographs in illustrated papers to supplement the cablegrams: a book of the first year's work to appear in the spring of 1922: and a series of lectures by one of the party in the principal cities of Great Britain to bring in further funds:—all for the continuance of the work in 1922.

The Committee had hoped to make an arrangement with a news agency that would have secured simultaneous publication of the cablegrams in all the principal newspapers of the country; but no sufficient offer could be obtained, and the Committee found also that if long reports went to all the London newspapers, no paper would give space to print them in full. In the end the rights in the cablegrams were bought by the *Times* and the *Philadelphia Ledger*; the *Times* included the cablegrams in its news service with the principal provincial papers of Great

Britain, and communicated them to several Indian papers, so that there was wide simultaneous publication, except in the London papers. The Committee had reserved the copyright in the cablegrams, and had stipulated with the purchasers for immediate publication that any paper should be at liberty to use them twenty-four hours afterwards; this arrangement was communicated to the London papers, but they took no advantage of it. Short, then, of giving away its valuable property for nothing, the Committee did all that it could to ensure satisfaction of the wide public interest in the expedition. This explanation is due to those who have regretted that many important newspapers have shown no interest in the expedition, and who may have concluded that there was some fault in the arrangements for publication made by the Committee.

NATURAL BEAUTY

The Heart of Nature, or the Quest for Natural Beauty.— Sir Francis Younghusband, K.C.S.I., K.C.I.E., President of the Royal Geographical Society. London: J. Murray. 1921. *Illustrations.* 12*s. net.*

THE book before us is interesting from several points of view. In the first place it is a fragment of autobiography: the revelation of a mind unfettered by ordinary conventions and singularly susceptible to the appeal of the external aspects of Nature. Sir Francis Younghusband's standpoint with regard to scenery seems to be very similar to that forcibly expressed by an eminent modern philosopher, the late William James, when he wrote "Scenery seems to wear in one's consciousness better than any other element in life. I have often been surprised to find what a predominant part in my own spiritual experience it has played, and how it stands out as almost the only thing the memory of which I should like to carry over with me beyond the veil unamended and unaltered. From the midst of everything else almost *surgit amari aliquid*, but from the days in the open air never any bitter whiff, save that they are gone for ever." Sir Francis's main purpose in the present volume is to insist on the importance of the cultivation of this sense of Natural Beauty—the taste for scenery as it is commonly called—and as a consequence to maintain that, since "any description of the Earth which excludes a description of its Natural Beauty is incomplete, Geography must include a description of Natural Beauty." To those who have for a generation striven to the best of their ability by precept and example to maintain this point of view it must be a great satisfaction to find it proclaimed *ex cathedrâ* by the President of our Society. If by some Sir Francis Younghusband's insistence may seem hardly called for, this will not be the view of those who have been intimately connected with geographical circles and teaching during the past fifty years. We are aware that there has always been a tendency—happily now a diminishing one—to ignore the etymological meaning of the word *Geography*, and to treat our science as concerned mainly with such facts and figures as can be incorporated in maps and Survey Reports. We have come across writers of scientific handbooks apt to indulge in a technical phraseology which often needs a glossary to make it intelligible to any but advanced students. There have been efforts in some quarters to deny the name of geographer to any traveller who did not

come up to the standard which is reasonably required of a professional surveyor. His work ran risk of being described—in a phrase borrowed from Germany—as "wholly devoid of scientific importance," even when he had been the first to give the world an accurate impression of the features of an unexplored river or the characteristics of a great mountain chain. The date is within living memory when it was a matter of serious doubt whether our Council might not consider the use of lantern slides in illustration of the evening lectures derogatory to the dignity of the Society. It has even been rumoured that on the first occasion any were shown they had been surreptitiously introduced by an adventurous Secretary! Any description of scenery from our platform required some daring and was regarded as out of place by a select portion of the audience.

Times have changed, but there still remains, we think, occasion to enforce the obvious fact that the public's first demand from the returning traveller is not a diagram of the bit of the Earth's surface he has visited, but the best picture he can supply of its characteristic features and colours, and, further, that in making this demand the public shows a true appreciation of what is the most serviceable result of exploration to mankind at large. We welcome therefore the President's appeal to the Society to recognize as part of its functions the duty to impress on the travellers who address it that it is their business to depict the picturesque aspects as well as the facts of Nature. To slightly modify one of Sir Francis Younghusband's own illustrations, he would have them warned against following the example of the Art critic who gives the exact dimensions of the Venus of Milo's figure—and leaves it there. How far the traveller can transmit, by word or writing, his observations and impressions to others will be the final test of his merits. Obviously the first requisite is that he should have a mind open to Natural Beauty. This quality may be stimulated or checked by surrounding influences. Its exercise is not incompatible with accuracy in observation; both qualities have their value and are at their best when united. When the Surveyor has given us the outline we need the Artist to put in the colour. To the Geographical Society both should be welcome guests, for both help us to realize the world we live in and the Nature of which we form part.

This brief summary does but imperfect justice to Sir F. Younghusband's eloquent appeal, which will doubtless have the influence it deserves on those to whom it is addressed. We have left to the last the descriptive chapters which fill the first part of the volume, for they are incidental to, and illustrative of, its main argument. They contain sketches of the icy wilderness—*sævis cautibus horrens*, "bristling with harsh peaks"—of the Karakoram and the immense wastes of the Gobi Desert; Sir Francis describes how among the labours and anxieties of the march to Lhasa he found refreshment in the wide landscapes and sublime solitudes and skies of the Tibetan highlands. He gives his readers a vivid description of the stages in the Pilgrim's Progress on the road to Lhasa. The traveller's path leads him through Sikkim, one of the most varied and exquisite regions on the Earth's surface. Starting from the outstanding spur on which Darjeeling stands, with its stupendous prospect of the snowy range, we are led through the lavish growths of the tropical jungle and the long mountain gorges to the flowery uplands that spread at the feet of the great glaciers of Kangchenjunga. Sir Francis describes in some detail the flora and fauna of the foothills and grows eloquent on the glory of the atmospheric effects constantly thrown on the magnificent canvas of 28,000 feet provided by Nature. We confess that in dealing with the fight for life in the forest depths his

habitual optimism seems to overlook the amount of defeat and suffering resulting from a struggle in which only the fittest survive. The first impression of a virgin forest is as a rule one of strife. The trees suffer from overcrowding; they jostle and even endeavour to throttle one another. In these enchanted woods individual character such as is the glory of an English oak or beech is rare. There is no burial of the dead; the rotting trunks stand like ghosts among the surviving giants of the grove. But the dead tree soon falls, and is kindly wrapt up in the exuberance of parasitic and creeping plants. The impression left on the passer-by is one of endless effort, of a battlefield splendid indeed in colour, but strewn with the trunks and limbs of the slain.

Sir Francis Younghusband characteristically suggests that Wordsworth might well have been awarded one of the medals of our Society in respect of his influence in depicting landscape, and inculcating an intimate appreciation of mountain scenery. Sir Francis himself is a true Wordsworthian, one who, wherever his career may carry him, "still is nature's priest"; one who not only asserts for nature an existence distinct from that of humanity, but also a controlling spirit of love and aspiration. Such a belief may seem to imply either a gift of overlooking a part of the facts that surround us, or a conviction that the suffering we see on all sides is essential to the development of a scheme of progress in the main benevolent. But happy is the man who can conscientiously affirm it! D. W. F.

REVIEWS

ASIA

La Démocratie Géorgienne.— Wladimir Woytinsky. Paris: Felix Alcan. 1921. Pp. vii. + 304. *Illustrations and* 2 *Maps.* 12 *frs.*

DESPITE the fact that a section is devoted to the country and the people, this book is only to a slight extent geographical; for the section named contains few facts, being largely devoted to an eulogy of the Georgians, a highly picturesque if not a very practical people. In essence the book is propagandist history; but it throws not a little light upon political and economic conditions in the Caucasus region since 1917, and is thus of indirect importance to the geographer.

As regards recent history the author states (p. 80) that in 1919 there were no separatist tendencies in Georgia; the figure would appear however to be a misprint for 1917. On 22 April 1918, as a result of the Brest-Litovsk treaty and the threat of a Turkish advance, the Democratic Federated Independent Republic of Transcaucasia, including Georgia, Armenia, and Azerbaijan, was formed. It lived five weeks, if it can be said to have lived at all, and on May 26 the Democratic Republic of Georgia was founded. Its policy was then defined in what M. Vandervelde, who contributes a preface, describes as "terms of noble and moving simplicity." To most people, however, they will appear to take insufficient account of realities, and the whole historical section seems to make it fairly clear that, sooner or later, and whoever rules in Russia proper, that Power will inevitably reabsorb Georgia; Azerbaijan has of course been already absorbed, in fact if not in name, and the process has begun in Georgia.

From the economic standpoint the most interesting sections are those dealing with the agrarian policy and finance of the Republic. The lands, largely forest, formerly belonging to the Russian state, to members of the Imperial family, and to the Church, were confiscated. So also were those belonging to

large proprietors, who were however allowed to retain a small part (average 25–27 acres) of their arable lands, orchards, and vineyards. No compensation was paid. The arable lands thus obtained were sold to landless peasants, or former tenants, at prices much below market value; the pastures were sold to the communes on similar terms; the forests became state property. The result of this law, passed in January 1919, is stated (p. 218) to have been a great increase in cereal production in 1920, rendering the country "almost completely" independent of external supplies. But on p. 250 it is stated that at the end of that year the price of bread at Tiflis rose to the unprecedented figure of 100–150 roubles per pound, and the budget for 1920–21 allowed a sum amounting to 30 per cent. of the total expenditure for supplying workmen and their families with bread and other provisions at a reduced rate. The sum allowed was soon recognized as inadequate.

Taxation proves a great difficulty. The peasants (despite the fact that many of them have been enriched at the expense of the former proprietors) have a great objection to direct taxes, although these are an essential part of the principles of "social democracy" (p. 250). Indirect taxes present difficulties in a country almost without manufactures and desirous of promoting foreign trade (p. 251); the continued emission of paper money means that the Georgian rouble depreciates at a more rapid rate than that at which the amount in circulation increases (p. 249). Any further direct confiscations are apparently impossible, but the problem "has been solved by developing the State enterprises and establishing a State monopoly on the principal articles of export" (p. 252). Meantime the deficit continues to increase; the author, however, assures us that the country has a brilliant future before it.

M. I. N.

The Raiders of the Serhad.— Brig.-General R. E. H. Dyer, C.B. 8vo. London: H. F. & G. Witherby. 1921. *Sketch-maps and Illustrations.* 15*s. net.*

So far as Persia is concerned, the Great War has increased our knowledge of almost every province. Perhaps its most remote corner is the district of Sarhad situated 100 miles to the south of Sistan, and surrounded by deserts which stretch eastwards for 400 miles to Nushki and Quetta and westwards for perhaps half that distance to Bam and Kerman. Sarhad boasts of a volcano in the Solfatara stage which rises to an altitude of over 12,000 feet and forms the culminating peak of an important range. The district is also the only elevated tract of country between Quetta and Kerman where sweet water can be found, this fact being proclaimed by the name of Kwash for its chief centre, the word signifying "sweet," and obviously referring to its water.

In 1915 German missions swept across Central and Southern Persia and drove out the small unprotected British colonies from Isfahan, Yezd, and Kerman. The Germans then set to work to organize a hostile propaganda among the wild, ignorant tribesmen on the frontiers of Afghanistan and Baluchistan. The British countered by establishing a cordon in Persia along the western boundary of Afghanistan. This was a matter of extreme difficulty, as, owing to the desert stretching as far as Nushki, munitions and supplies had to be brought on camels for a distance of over 500 miles to Sistan, which was the advanced base of the cordon. It was clear that if the convoys were attacked, or even menaced, an escort would mean that extra transport would have to be found, or, in other words, that fewer supplies—perhaps only one-half—would reach the Eastern Persian cordon.

The Germans, accordingly, subsidized the tribesmen of Sarhad, who

revelled in raiding. They cut up the caravans, and General Dyer was appointed to set matters right. Fortunately for him, Colonel Webb Ware had given the whole of his official life to opening up a caravan route across this inhospitable waste, to enlisting and training levies, and to establishing British influence. That his strong personality had been successful in this task, Dyer bears witness in his warm eulogy of Idu, who was his right-hand man throughout the campaign. Idu had been a leading raider until Webb Ware appeared on the scene, and won him over to the side of law and order.

Dyer had the difficult task of fighting a campaign almost without troops. However, with a mere handful of men and two guns, a force which gave out that they were the advance guard of a British army, he bluffed Jiand Khan and other chiefs into submitting and gained possession of Kwash. This was a case of "so far, so good," as it drew the raiders away from the lines of communication, but when they realized how they had been bluffed they were naturally furious. However, by the exercise of extraordinary skill, Dyer defeated Jiand and other chiefs, and the Sarhaddis finally accepted British control and enlisted as levies.

The book gives little geographical information, but clearly much survey work was undertaken, which will reach the map-room in due course. Routes were opened up, along which cars could travel, and the construction of the railway from Nushki to Duzdap on the Persian–Baluch border must have ultimately changed the entire situation. The light that is thrown on the point of view of the Sarhaddi raiders and of the staunch British levies is most instructive and deeply interesting. But the strongest impression that remains is that a handful of Indian troops and levies, under the inspiring leadership of Dyer, accomplished great deeds for the Empire with wholly inadequate resources. The book may be recommended strongly to the general reader and to all, old or young, who love to read of adventures which are stranger than fiction.

P. M. SYKES.

Travels of a Consular Officer in North-West China.— Eric Teichman, C.I.E. Cambridge University Press. 1921. *Maps and Illustrations.* 25*s.*

A preliminary and fairly detailed account of his journeys in Shensi and Kansu has been given by Mr. Teichman in the *Journal*, December 1916 and December 1918. In South Shensi these covered the country between the Wei and Han rivers, traversing and retraversing the Ch'in-ling range and the mountainous country to the south of it, of which I think Père David was the first explorer, rubbing shoulders against the Tai-pai Shan, 12,000 feet, and escaping near the source of the Han River of Szechuen and Chengtu. In East Shensi, the travels extended to Yen-an Fu, keeping both on the outward and return journey at some distance from the Yellow River, which entailed the constant crossing of deep rifts, with a south-eastern direction, in the loess land.

In Kansu, after reaching Lan-chou Fu by the Liu-p'an-shan route from Si-an Fu, journeys were made to the Ch'in-ling range, in the south and south-west of the Province ; to the irrigated lands fed by the snow-covered mountains near Liang-chou Fu in the north ; to Labrang lamasery and the border of Koko Nor ; and finally to Peking by raft, boat, cart, and rail.

An immense mass of valuable information regarding commercial routes, the courses of rivers and mountain ranges, forms the foundation of the volume. The journeys themselves throw a very interesting sidelight on the changes taking place in China. The mere fact that such an expedition should have received every assistance from local officials and been welcomed in every town is worthy of note. Alongside of this must be placed the new system of educa-

tion on foreign lines introduced after the Revolution. To the latter are also due new names of towns, new titles of officials, and direct correspondence between local officials and their provincial chiefs. And change is still at work. The relations between Tibet and China have changed since the date of the journeys ; the cultivation of opium has revived ; a new form of script has been introduced, which may be the prelude to a new era ; and a colossal tragedy has occurred in the P'ing-liang country through an earthquake, which has occasioned not only a terrible loss of life, but presumably great changes in the local features of that loess country.

In some respects the journeys in Kansu are the more interesting part of the book. Apart from the fact that there is more incident recorded, the people themselves in their development of the lands wherever possible by irrigation, and the curious position of the Mahomedans, attract attention. Though the Mahomedans were massacred without mercy by Tso Tsung-t'ang in the seventies, and by Tung Fu himself in 1894, it is they who have been the most loyal upholders of the Peking Government. Mahomedan officials have shown themselves the most capable administrators, and it is Mahomedans who act as intermediaries between Chinese and Tibetans in trade. Of Tung Fu Hsiang's life Mr. Teichman gives a very interesting record, in connection with his home in Kansu.

While in North Kansu and in the Han and Wei valleys in Shensi the picture painted is very encouraging, in East Shensi and South Kansu White Wolf bandits, ex-soldiers, and soldiers have produced an area of almost complete desolation. It is pleasant to turn from such scenes to the beautiful country south of the Ch'in-ling range and on the southern borders of Kansu, where game of many kinds abounds in the forests, and one view vies with another in beauty, as shown in the photographs which richly illustrate the book.

Short as the volume is, it deserves a longer review, for there are many interesting points, such as the theory regarding loess deposits, which have necessarily to be passed over. The same thing may be said of the subject of the book, for throughout the reader feels with regret that so much of a personal nature has been omitted of which he would like to hear. The references to shooting experiences are specially tantalizing in their brevity.

Mr. Teichman complains of the badness of the maps to which he had access. It is to be hoped that Filchner and Tafel's maps may soon be reproduced in a form more available for later travellers than that of their original issue. The latter's maps of the Yellow River made from personal survey, extend from Tung Kuan, with the exception of a few gaps, to the source of the river, and contain many surprises.

The volume is well illustrated with photographs of people and scenery, and concludes with two chapters on the missionary question and railroads, which are well worthy of attention. Members of the China Inland Mission who recollect how they were criticized at the outset for adopting Chinese dress, may perhaps think it hard that the author should blame them now for thinking of giving it up, and yet the criticism in both cases does seem to have had some justification. W. R. C.

AFRICA

Collection des Ouvrages Anciens concernant Madagascar, publiée sous le direction de **MM. A. Grandidier,** de l'Institut, **Charles Roux, H. Froidevaux** et **G. Grandidier.** Tome ix. Paris : Union Coloniale. 1920.

This volume contains two works on the early history of French colonization in Madagascar. The first is from the pen of Etienne de Flacourt, Director of

the French East India Company, founded in 1642, and Commandant of the island. It gives an account of the first expeditions to Madagascar and the struggles with the natives, surveying the course of events from 1642 to 1660. The company obtained in 1642 an exclusive concession to trade and colonize in Madagascar and sent out the same year a vessel under the command of a Protestant, Pronis. Pronis got on better with the native chiefs than with his Catholic subordinates, and when news of mismanagement, scarcity of food, and mutiny reached France, the Company in 1648 sent out Flacourt to take charge of the colony and establish trade. Flacourt was a man of enterprise and capacity. He reduced the natives to submission and studied the resources of the island. Had he received the support from the Company for which he looked the colonizing enterprise would have made progress. But to the difficulties of the climate, the food supply, and the continual wars was added the neglect of the Company. In 1655 Flacourt returned to France to reawaken the interest of his employers, and in 1658 appeared the first edition of his work with its narrative of his exertions and its sanguine advocacy of French colonization in Madagascar. He believed that Madagascar might be made by the French a great centre of agriculture, trade, and industry, a place of victualling for their East Indian ships, and a base for expansion into the unknown lands of the southern hemisphere. He drew a plan for its systematic colonization. Settlements were to be made at a number of places, of which Fort Dauphin would be the chief. He discussed the position of the Church, the government, the military establishment, the labour supply, and the land tenure. Soldiers and artisans were to be taken out, and in due course to be given lands on feudal terms in return for their services. Protestants were to be excluded. While expressing these hopes for the future, he did not spare the Company for their neglect in the past, for their impatience of gain, and their failure to realize the initial difficulties with which the pioneers of such a colonial venture were inevitably confronted. But in the meantime affairs in the colony were going from bad to worse, and Flacourt himself was to die on his return voyage in 1660.

The second work is an extract, dealing with Madagascar, from the 'Memoirs on the Establishment of French Colonies in the East Indies' of François Martin, Governor of Pondicherry, who, before serving the East India Company in Southern India, was posted for three years on a station, Fénerive, in Madagascar. Here as merchant and explorer he learned a good deal by his own observation and the reports of his officers about the people and products of the country, and this he incorporated in his memoirs. He twice visited Fort Dauphin, the principal station of the French in the country, and in 1668 was transferred to Surat. He was acquainted with Flacourt's book, but his own experiences made him less sanguine of the commercial possibilities of the island. He felt that the French had been misled by the accounts they had heard of Madagascar, and could not expect much advantage from it: worse than that, they had shown in Madagascar, as elsewhere, far less faculty for oversea expansion than their rivals the Spanish, English, Portuguese, and Dutch.

The two works have been carefully edited with biographical and bibliographical notes, and the volume is indexed and illustrated with a number of maps and plans. A sketch of the course of events in Madagascar from 1660 to 1664, the interval not covered by Flacourt or Martin, is extracted from Derm's collection of documents relating to the East India Company of 1664, and given in an appendix. E. A. B.

AUSTRALASIA AND PACIFIC ISLANDS

Tahiti.— Tihoti (George Calderon). London: Grant Richards, Ltd. 1921. Demy 8vo. Pp. 260. *Fifty Portrait Studies.* 25*s. net.*

No one who is familiar with other writings of the late George Calderon, or has gained some understanding of his poetic soul, will be disappointed on making acquaintance with this last remarkable product of his genius. Because he did not live to see it through the press, "the reader" (says his widow in the preface) "will understand how the book inevitably shows unevenness, save for the chapters which had received the author's finishing touch." But it is just one of those books in which spontaneity and vein constitute much of the charm, and where "finishing touches" are more apt to mar than to embellish. Continuity of theme is, in fact, scarcely material; for whether in soliloquy, in converse, in narrative, or in description, the glamour of Tihoti's words never wanes. His sentences seem as if they had welled up within him without effort, without thought, inspired, as it were, by the stimulus of external influences of the moment without any act of volition on his part, and had merely overflowed incontinently from the author's pen. Yet behind this atmosphere of reverie lie enshrined the palpable features of the native's dreamy, irresponsible life, so garnished by the telling that the reader is halfway through the book before he awakens to the truth that he has been learning history (albeit not much geography) while he supposed that he was only reading romance. Tihoti, which is merely the Tahitian enunciation of "George," shared the natives' life for the time being, as many others have done; but he knew when it was time to renounce his lotus diet, and lingered only for a moment from the call of duty and return to Europe, to which not all who have imbibed the nectar of Tahiti's spell have so soon responded.

When George Calderon comes to a sober relation of bygone history his writing appears to less advantage. The essence of the man was his originality of thought and expression, whereas information about the remote past must be quaffed from the fountains of legend and the written or printed records of olden time. It might have been better, for more than one reason, if § xl of this book had never been written, or if it had not been included in the volume. The same may be said of the philological effort at pp. 257–8, which contains notable errors. It is a pity, too, that the volume exhibits several typographical slips in Tahitian names and words—Punaauia is misspelled at least four times, and appears as "Puauia" in a fifth instance. The author's *u* and *n* seem to have perplexed the compositor: hence also *Tiuito* for *Tinito*, *Raugatira* for *Rangatira*, and *Thonars* for *Thouars*. Other errors of this class are *nui* for *niu* (p. 257), *ite* for *iti*, *Ta* for *Ia*. But Sir John Burrow for Sir John Barrow (twice) should not have escaped correction; and one wonders why the author wrote Poumotu throughout for Paumotu (or preferably Tuamotu), and Mourea for Mo'orea. He is right in declaring that *pua'a toro* is unconnected with the French *taureau;* but quite wrong in the derivation he ascribes to it. It is simply *pua'a toro* from the Peruvian bull introduced in 1774, at Tautira, by the Spanish frigate *el Aguila*, from Lima. Tihoti is unjustly bitter against the early missionaries at Tahiti, whom he stigmatizes as little better than idiots or criminals. He forgot that they acted in what they believed were the right interests, according to their lights, and that their lights were the lights of the times in which they had grown up, and of the Society's Directors who sent them out. It is their limitations rather than their faults, that we have to deplore, for they knew no better. Tihoti is no less violent in his language towards Captain Bishop and the crew of the *Nautilus* (p. 195), who were

neither pirates nor "blackbirders," but fur-traders; and a singular slip, which might have been set right by the editress, is the substitution of Captain Bligh for Captain Edwards, of H.M.S. *Pandora*, on p. 204. The statement on the first page (17) that Tahiti was discovered in 1606 by Queiros is contradicted at the head of p. 199, by the mention of Wallis; the latter is correct, the former is only an absurd conjecture which has been repeated in most works of reference to this day. Dogs existed in Tahiti long before Spaniards came there.

The book is adorned with a series of exquisite pencil studies of natives and *métisses*, every one of which is a speaking likeness, drawn by the true hand and eye of inherited genius and worthy of the highest praise. But while the artist seems to have formed an exaggerated idea of what he terms the "protruding lips" of Polynesians, it is rather singular that the more obvious feature of flat nose appears to have escaped his notice; and in several of his drawings the nasal bridge is distinctly aquiline. Nevertheless the book and its portraits are full of charm and will doubtless achieve much success. B. G. C.

THE MONTHLY RECORD

EUROPE

The Rainfall of Norway.

THE salient features of the distribution of rainfall in Norway are brought out by B. J. Birkeland in vol. 1, No. 3, of the *Geofysiske Publikationer* (Kristiania, 1920). Except where orographic factors provoke excessive condensation from the moist Atlantic winds, the mean annual values are rather low, as one would expect in so high a latitude. Thus, whereas places on the west coast like Bergen and Kristiansund get more than 80 inches, those in the interior of southern Norway, like Røros, as well as in the extreme north, like Alten, receive only between 10 and 20 inches. In Kristiania the amount is 26 inches. The seasonal course of the main rainfall is far from simple. In the interior of the southern part of the country, where the seasonal variation is rather large, summer is the wet season, as it is also in the other dry region in the far north, with a similar large variation. On the wet west coast, where the variation is small, autumn is the wet period, as it is also on the south coast, where the variation between the wettest and driest month is about the normal for the country as a whole. The driest period is everywhere some time in the spring.

In comparing the wet and mountainous west coast of Norway with the similar western coasts of the British Isles an interesting anomaly appears in the incidence of the wettest month of the year. Though in both regions the autumn and winter have each a heavy rainfall, on the west coast of Norway it is October which is the wettest month; whereas, along the western seaboard of Scotland and Ireland it is December or January. A comparison between the average wind and pressure charts of Northern Europe for October and January suggests that over Scandinavia there is a greater proportion of southerly winds in winter than in autumn, which would blow parallel with rather than perpendicular to the mountains of the west coast. It is probable that this, in part at least, affords a clue to the discrepancy.

Geographical Surnames in Italy.

A somewhat novel study in human geography has been made by Prof. O. Marinelli, who gives the results in the *Vie d'Italia*, the monthly organ of

the Italian Touring Club, for May 1921. Detained unexpectedly for some hours at a railway station in Milan through some mishap on the line, he occupied himself with glancing through the names of residents as given in the commercial directory, and was struck with the geographical interest arising from the number of names derived from localities in which the bearers must have had their first origin, and which therefore might shed valuable light upon the early development of the city. He subsequently extended the inquiry to Florence and Rome, and he embodies the conclusions reached in a series of sketch-maps, showing for each of the three cities the proportional contribution of the various parts of Italy to the geographical surnames found in the cities. For Milan he also gives a map showing all the localities around the city which have served as origins of Milanese surnames, thus indicating the extent to which the great Milan of the Middle Ages derived its population from the sub-Alpine zone of North Italy. The places lie particularly thickly in the area north of the city, between Lake Maggiore in the west and Bergamo in the east. A consideration of the circumstances under which surnames became fixed, in about the eleventh and twelfth centuries A.D., shows that these geographical surnames must represent an influx of artisans from the surrounding region at one or other of the early periods of industrial development in the Lombard metropolis. As regards the contribution of the various parts of Italy to the Milanese geographical surnames, whilst the influence of propinquity is of course more or less paramount, certain facts are not to be explained by this influence, *e.g.* the relatively large number of names supplied by Southern Sicily and the districts round Bari, Ancona, etc. It is hardly to be explained, either, as due to closer relations maintained between Milan and these districts, nor again does the map showing the distribution of Jews in Italy lend support to the idea that an influx of Jews from these regions may have been the cause. Although Jews were commonly known by their place of origin, Prof. Marinelli considers that too much stress must not be laid on this, as the Jews favoured the larger cities mainly, while the geographical surnames are in great measure derived from quite small places. A contrast is to be drawn between Milan and Florence in the much smaller proportion of geographical surnames found in the latter than in the former ; the reason probably being that owing to the later industrial development of Florence most of those attracted to it from neighbouring districts had already acquired recognized surnames at the time. Prof. Marinelli also gives maps showing the relative contribution of various parts of Italy to the actual total population of the cities, and the picture is markedly different from that supplied by the topographical surnames only, the effect of distance being much more definite in the former case. The study seems to be one which well merits the attention of geographers, though all countries may not be so rich as Italy in the type of surname in question.

The Currents of the Adriatic.

For several years before the war a thorough study of the physical conditions of the Adriatic had been carried out by co-operation between the oceanographers of Italy and Austria. Among other means adopted an important place was taken by the investigation, on the Italian side, of the *régime* of the currents by means of floats set adrift in considerable numbers at stated periods, and a record of the points at which they were ultimately recovered. A first publication of results, dealing with the observations of 1910–11, was made by Prof. G. Feruglio in the *Bolletino del R. Comitato Talassografico Italiano* for 1912. The work was continued in 1912-14, and the results were being prepared for publication by the same writer when the war intervened, in which he

unfortunately lost his life. They are now published, together with a reprint of the former paper and an appendix completed by Prof. L. de Marchi, as *Memoria* No. 55 of the same committee (Venice, 1920). The body of the memoir discusses the results of each separate cruise in turn, with charts showing the course of each float recovered and the conclusions to be drawn from the data. In the appendix, which is also largely the work of Prof. Feruglio, an attempt is made to control the conclusions based on the float-voyages by a study of the surface distribution of salinity and temperature as observed during the cruises, a general summary of conclusions as to the Adriatic circulation being given at the end. While confirming broadly the notions previously held, mainly on the basis of the observations of Wolf and Luksch published at Vienna in 1881, they bring out a good many new facts in points of detail, and as they are supported by the most extensive series of experiments with floats ever carried out, they merit considerable confidence. Broadly the main features are an upward (*i.e.* north-westerly) movement along the east coast of the gulf (due in part to an influx of water from the Ionian Sea through the Strait of Otranto, though this is by no means constant), and a downward one along the west coast, with transverse movements from east to west in the latitudes of the Gargano peninsula and of Ancona. Towards the north, however, the northward-flowing current takes a more central course, with circulatory movements on either side, so that there is a tendency to a southward movement down both coasts: in the Gulf of Venice there is an independent vortex movement, in the direction contrary to the hands of a clock, due to the influx of the fresh water from the Po. The western current down the coast of Italy does not become established, as a rule, until about the latitude of Ancona, though it may be reinforced by the current which comes down from the coast of Istria. Below Ancona it follows the coast to the extremity of the Gargano peninsula, by which it is diverted into the open sea. Continuing in a south-east course, a portion makes its exit on the west side of the Strait of Otranto, bending round into the Gulf of Taranto, but another part usually takes an easterly direction and is merged with the ascending current along the Albanian coast. The records of the float-voyages show that the movement is generally slower than has been supposed, the surface layers being subject to many opposing influences. The ultimate causes of the currents are too complex to be determined from present knowledge.

ASIA

Hodeida before and after the War.

Lieut.-Commander C. Craufurd, R.N., who from his service in South-West Arabia both during and since the war has had full opportunity of studying present conditions in that part of the world, sends us some notes on Hodeida, the principal outlet on the coast for the commerce of a large part of Yemen, in spite of its natural disadvantages as a port. The place has, he says, changed greatly since it passed out of Turkish hands as a result of the war. Although mentioned as a port in the old Arab histories, Hodeida was probably little more in those days than a fishing village, and no traces of an old town remain on the present site. Possibly the ancient Hodeida lay some 20 miles further south near the outlet of the Wadi Saham and near the Khor Ghuleifaka, which would afford shelter for dhows, and was a flourishing harbour in still earlier Arab history. The present town was founded by the Turks, with no thought of its suitability or otherwise as a harbour. It lies near the centre of a small bay, an open roadstead fouled with submerged coral reefs, and unprotected from the

strong southerly gales of the prevailing wind. From northerly winds it is fairly well protected by Ras Zedia, a coral spit which terminates in Ras el Khetib. In spite of its disadvantages, Hodeida under the Turks became a flourishing little port serving as the main outlet for the richest province of Southern Arabia. To the north lay palm groves and gardens, while level sandy roads—all that was required for camel transport—ran out some 30 miles to the north and north-east, and to the ancient Zebid in the south. A few rulers have motor cars and some of the municipalities own a few dust-carts and water-carts, mostly camel-drawn. In the desire to move with the times the Turks consulted with European advisers, who pointed to the advantages of Ras el Khetib as a port and the possibility of connecting it with Hodeida by a railway. This idea soon developed into the more ambitious scheme for a line into the interior which should eventually reach Sanaa by the cool highlands of Menakha. Such a line was actually begun,* but shared the fate of many other Turkish undertakings. Funds ran short, labour was not available to unload the cargoes of rails (some of which were therefore dumped into the sea), and, to provide the pay for the Turkish troops guarding the line from raiders, the sleepers were torn up and sold for building material or firewood. During the war Hodeida suffered many light bombardments from British war vessels and one severe punishment, which was borne with true Turkish stoicism. The place has since passed into the hands of the Seyidt Idrissi, one of the most enlightened rulers of the whole peninsula, and under beneficent Arab control is rapidly recovering from the ravages of war. Barbed wire fencing has been erected (sufficient to discourage Bedouin raiders) with three gates provided with customs stations. That on the north commands the caravan route from the Wadi Bajil ; another, on the east, that which brings down the produce of Wadi Buraa and Jebel Roma ; and a third, on the south, that from the Wadi Saham and the rich El Absiya country. Already the bazaars are refilling, traders are returning, and when the world's shipping recovers its forces, the place will be found ready for overseas trade. It is a charming Eastern town, full of quaint byways, but in its present condition answers little to pre-war descriptions. Owing to the spread of Idrissi influence it is at present incorrect to assign the place to Yemen. Commander Crawfurd is at present the only European resident in Asir, an interior district north of Hodeida.

The Ancient "City of Bengala."

One of the puzzles that will probably be never definitely solved is that of the identity of the city spoken of by early travellers under the name Bengala (or Banghella) as the chief commerical emporium of the kingdom of the same name. It has been discussed (among others) by Mr. G. P. Badger in his edition of Varthema's travels, and by Sir Henry Yule both in 'Cathay' and in 'Hobson-Jobson.' The latter gave the weight of his great authority in favour of the identification with Chittagong, holding that it was a case of transferring the name of a country to one of its principal cities or ports, a habit which he attributed to the Arabs generally. The latest and most thorough discussion of the problem is that of Mr. Longworth Dames in the second volume of his admirable edition of Barbosa (the first writer after Varthema to mention the city as "Bengala"), lately published by the Hakluyt Society, which we hope soon to review in the *Journal*. Mr. Dames devotes to the subject a note extending to nine pages of small type, in which, after summarizing all the

* Some account of the surveys for the line, made by the French engineer M. Beneyton, was given in the *Journal* for January 1914.

evidence extant and the views of previous commentators, he gives it as his opinion that by "Bengala" the old capital Gaur, taken together with its subsidiary port or ports (Satgaon or Sunargaon or both), is intended. A striking piece of evidence in favour of this is the mention of "Gaur-Bengāla," apparently as one city, in an inscription at Kandahar dating from 1594. Mr. Dames contests Yule's view that the Arabs were accustomed to use the name of a country for its principal town, though they occasionally, he says, followed the reverse custom. Yet he allows that the city of Gaur took its name from the country, and that the name Bangāla "seems in its turn to have passed in common usage from the country to the capital," so that the objection to Yule's view seems limited to his ascription of the practice to the Arabs. As against Chittagong Mr. Dames holds also that it was only temporarily and imperfectly subjected to Bengal, and was thus hardly likely to be taken for the latter's principal port in Barbosa's time. Its later use by the Portuguese, under the name Porto Grande, as their chief port of entry, was, he thinks, principally because there was no strong government there to fight against.

These considerations are weighty, yet some may think that there is still something to be said for Yule's view. Thus the Cantino map of 1502 already shows Chittagong prominently as one of the two great ports of this part of India (the other being Satgaon), and the position given to it at the point where the Bay of Bengal runs up into a funnel-shaped opening in the land fits in well with Barbosa's account.* Again, the Turkish sea-book, the *Mohit*, edited by Bittner and Tomaschek in 1897 (*Journal*, vol. 11, p. 76), which though considerably later in date (1554) than Barbosa, has been shown by Tomaschek to have been based on earlier sources, describes precisely the same state of things, Chittagong being spoken of moreover (to use Bittner's translation) as "der Hafen Satí-ğâm, *d.i. das östliche Bangāla*," while the boundary of Bengal (with Rakkang, *i.e.* Arracan) is drawn a good way down the east coast of the gulf. That little weight can be attached to later cartographic representations, in which Bengāla and Chittagong appear as distinct places, is evident if we consider Gastaldi's map of 1561, where the city of Gaur appears in four different forms (five, if Bengala stands for the same city), viz. Gaur, Scierno, Cernouen (the two last representing its name *Shahr-i-nao* or "New City," as noted by Yule), and Cor on one of the effluents of the mythical lake Chiamay, supposed by Mendez Pinto to be the Ganges. Nor can great importance be allowed to geographical compilations such as Heylin's 'Cosmography,' in which (ed. of 1652) Bengala is mentioned as a great city in addition to Gaur, Catigam, and Porto Grande, the writer being also ignorant of the identity of the two last named. Heylin would have it that the country took its name from the city.

GENERAL

Water-Power of the British Empire.

In November 1917 a committee of the Conjoint Board of Scientific Societies was appointed to report on what is at present being done to ascertain the amount and distribution of Water-Power in the British Empire, and reports were presented by it in 1918 and 1919. These have been followed in 1921 by a third and final report embodying additional informa-

* It does not seem impossible that Barbosa's description may actually have been influenced by a knowledge of charts like Cantino's, for there are many indications that the notions of early writers were largely tinged by their knowledge of current maps, as well as *vice versâ*.

tion received both from Great Britain and other parts of the Empire, and taking stock generally of the position disclosed by the inquiry. In the United Kingdom the greater part of the water-power is in Scotland, where nine sites had by 1919 been specially examined. It is calculated that the possible output for the whole country is well over 1,000,000 continuous horse-power, of which a considerable proportion is commercially feasible under present conditions. In India a large number of possible sites have been brought into notice, but little precise information is yet available, though it is hoped that it will be forthcoming before long as a result of investigation already set on foot. A project put forward in Ceylon involves the utilization of two streams in the Central Province under a head of about 1950 feet, and will, it is thought, be capable of giving a continuous output of 100,000 h.p., an amount which could be largely increased by additional storage. In British East Africa it is hoped that a systematic study of water-power possibilities may be set on foot, and it is suggested that the hydrographic investigation for the Kenya Colony, Uganda, and the Tanganyika Territory might be co-ordinated under central control. Ripon Falls is the source of power likely to come first into consideration. A preliminary survey of the water-power of British Guiana has already been made, and it is proposed to install automatic gauging stations on the principal rivers. In British Honduras the main resource appears to be the Vaca Falls, 700 feet high, which would yield from 250,000 to 1,000,000 h.p. according to the season. In New South Wales the project attracting most attention is one for developing power at Gorge on the Clarence river; but a comprehensive report on the general water-power of the state is in preparation. In Victoria various schemes have been put forward, the most important being one for the utilization of the headstreams of the Kiewa river, rising in the highest parts of the state, and giving a large fall though no very great volume. On certain rivers a difficulty will be caused by the great variation between summer and winter flows and the possible conflict at low-water stage between the requirements of irrigation and power use. In many parts of the Empire where resources are known to be large, little has yet been done to obtain precise information, whilst in Canada on the other hand investigation and development are highly organized, and a definite move has been made by other governments. As a whole the Empire compares unfavourably with its commercial competitors in water-power development, which at present reaches only some 5 per cent. of the total available, as against 20 per cent. in the United States and 18 per cent. on the Continent of Europe. Of the total developed in the Empire 72 per cent. is in Canada. It is urged that an Imperial Water-power Board should be formed to promote investigation on a uniform plan and the recording in convenient form of information obtained from all parts of the Empire. By this means it should be possible for any capitalist or company needing cheap power in large quantities to obtain accurate data both as to power available and probable costs of its use. It cannot be doubted that the development of water-power is a pressing need in view of the competition of foreign rivals, however much we may deplore the loss to natural beauty which can hardly fail to result from such development.

Gilchrist Studentship.

The Gilchrist Trustees once more offer, for 1922–23, a Studentship in Geography of the value of £80, which may possibly be increased somewhat, but not so as to exceed £120 in any case. It will be remembered that the Studentship is intended to promote improved teaching of geography in schools,

and candidates must be teachers with at least two years' experience. They should send in their names before the end of January 1922 to Prof. L. W. Lyde, University College, Gower Street, W.C.1, giving references and a statement of their previous work, together with three testimonials.

The New List of Fellows

As announced in the leaflet inserted in the present number, a new list of Fellows of the Society has been issued, corrected to 30 September 1921, and may be obtained, by Fellows only, at the Society's House at the price of 2*s.* 6*d.* As the cost of preparing the list is very considerable under present conditions, it is hoped that there will be a good demand for it, for the regular issue of such a list will be impossible unless the bulk at least of the expense is met by the proceeds of sales.

OBITUARY

William Speirs Bruce, LL.D.

WE regret to record the death of Dr. W. S. Bruce, which occurred at Edinburgh on October 28, at the early age of fifty-four, after a long illness due to strain and overwork in recent years. The son of an Edinburgh surgeon, Dr. Bruce studied medicine, but, before the completion of his course, sailed for the Antarctic in 1892 in the whaler *Balæna*. This cruise to the north-east of Graham Land enabled Bruce to make the first scientific observations of recent times in Antarctic seas, and it not only helped to reawaken interest in Antarctic exploration but also led eventually to the start of finner whaling in south Atlantic waters. In 1894 Bruce got the consent of the owners to join the whaling cruise of the *Antarctic* to the Ross Sea, but could not reach Melbourne in time. Zoological work in Edinburgh, and experience in the *Challenger* Commission Office occupied Bruce until in 1895 he took charge of the Ben Nevis observatory. In 1896 he joined the Jackson-Harmsworth expedition to Franz Josef Land in the *Windward*, and during its last year in the field assisted in the survey of the western part of the archipelago and investigated the fauna of the islands. In 1898 he visited Kolguev, Novaya Zemlya, and Hope Island in Major A. Coats' *Blencathra*, and immediately on his return to Tromsö sailed with the Prince of Monaco in the *Princesse Alice* to Spitsbergen. In the following year he returned with the Prince to Spitsbergen and took a leading part in the hydrographical survey of Red Bay. All this time Bruce had been planning to take a scientific expedition to the Weddell Sea. In 1902 he was at length successful in raising the funds in Scotland, largely with the help of the Coats of Paisley, but without Government assistance. The "Scottish National Antarctic Expedition" sailed in the *Scotia*, one of the fastest and strongest vessels ever built for polar work, and carried a full scientific staff. The expert ice master, T. Robertson, was in command. The expedition was to specialize in oceanography, meteorology, and biology, and Bruce had no aim to break records in latitude unless the call of scientific research led in that direction. Two summers were spent in exploring the unknown Weddell Sea, and as no harbour was found in the first year the *Scotia* fell back on the South Orkneys for winter quarters, where the expedition explored and mapped Laurie Island. By the discovery of Coats Land in lat. 74° S. in March 1904 the coast-line of Antarctica was found to lie many degrees north of its supposed position in that region. No landing was possible, and the ship was extricated with

difficulty from dangerous ice pressure, in which she proved her great strength. No discovery since that of Victoria Land by Ross in 1841 had made a greater change in the chart of Antarctica. Sounding the supposed Ross deep, where 4000 fathoms, no bottom, had been reported, the *Scotia* found a depth of 2660 fathoms. This was one of a long series of soundings in the South Atlantic and Weddell Sea, which were accompanied by physical observations and, on many occasions, by deep-sea dredging. On the way back to Cape Town a landing was made on the almost unknown Gough Island. On his return Bruce devoted himself to arranging the scientific results of the expedition. Some six volumes have been published, but for lack of funds the task is still unfinished. It is noteworthy that apart from publication of results the cost of the *Scotia* expedition, including the ship, was not more than £35,000, a remarkably small sum to yield such great results.

It had long been Bruce's ambition to see an oceanographical institute in Edinburgh, and he made a beginning in the Scottish Oceanographical Laboratory which housed his collections, books, and apparatus, and was financed by his own efforts. Failing strength, however, forced him to dispose of it in 1920, and the collections are now in the Royal Scottish Museum. In 1910 Bruce announced plans for another Antarctic expedition which included a bathymetrical survey of the far south Atlantic, and first suggested the idea of crossing Antarctica from Coats Land to the Ross Sea. In spite, however, of most determined efforts the funds were not forthcoming. Between 1909 and 1920 Bruce paid seven visits to Spitsbergen, a country on which he became the leading authority. His work included the detailed exploration and mapping of Prince Charles Foreland, hydrographical work on the west coast and in Stor fjord, and extensive researches in coal and other minerals. His large-scale map of the Foreland was published by the Prince of Monaco in 1912.

Bruce was a man who looked for no rewards for his work, and his retiring nature made him relatively unknown to the public, but he was a Gold Medallist of this Society (Patron's 1910), the Royal Scottish Geographical Society (1904), and the Royal Society of Edinburgh (1911), while as recently as last year he was awarded the David Livingstone Centenary Medal by the American Geographical Society. He was a member of the Committee of the Oceanographical Institute at Paris, and an honorary LL.D. of Aberdeen University. An honour that appealed to him as much as any was the inscription of the name of the *Scotia* among great oceanographical expeditions on the façade of the Oceanographical Museum at Monaco. In addition to editing the *Scotia* results Bruce wrote a great deal on Spitsbergen. For a year he was in charge of some whaling operations at the Seychelles, but the tropics were always distasteful to him and he was not sorry to return. He found more congenial work in research into the early history of sealing and whaling in the South Shetlands and Graham Land. Some of his investigations are published in "The Weddell Sea: an Historical Retrospect" (*Scot. Geogr. Mag.*, 1917) and others in the new Antarctic Sailing Directions. Bruce also wrote on Arctic natural history and published a volume in 1911 on 'Polar Exploration' (Home University Library).

In the field he was an ideal leader, expecting much of his companions but never as much as he gave himself; dauntless in his enthusiasm, but taking risks only when they were necessary; and generous and unselfish to a fault. With a devotion to polar exploration characteristic of the man, Bruce left instructions, written during his last illness, that after cremation his ashes were if possible to be scattered in the South Atlantic in about long. 10° to 15°

E. in a high latitude, where bathymetrical survey is required and a landing on Antarctica should be attempted. It is hoped to carry out the spirit of these wishes. R. N. R. B.

John Thomson.

By the sudden death of Mr. John Thomson on October 7 the Society has lost one of its oldest members; he had been a Fellow for fifty-five years, having joined in 1866. He was in his eighty-fourth year, having been born in Edinburgh in 1837. He attended the university of his native town, giving special attention to chemistry, and ultimately devoting himself to photography. Before settling down as a professional photographer in London, he decided to travel in Asia, largely with the view of utilizing photography to record the characteristic features of the countries and people of the Far East. He was, indeed, the pioneer in the application of photography to travel, and when it is remembered that in those days only the wet-plate method was available, the difficulties Thomson had to face will be realized; the results achieved reflect the highest credit on his resolution and his skill. Starting in 1862, he landed in Ceylon, but unfortunately through illness had to return without being able to accomplish much. Starting again in 1865 he sailed directly for the Malay Peninsula. After working for a time in this region, he proceeded to Siam and Cambodia, where some of his best work in photography was done. He succeeded, among other triumphs of his career, in recording the remains buried in tropical jungles, obtaining excellent pictures of the famous Nakhon Wat ruins, which greatly enhanced his reputation. Leaving Cambodia he proceeded to Macao and Hongkong. From Amoy he crossed to Formosa, traversing the west coast and pushing a considerable distance into the interior. Returning to the coast of China, Thomson resumed his pilgrimage, touching for a time at Fuchow, Chusan, and Shanghai, making occasional journeys into the interior. From Nanking he proceeded up the Yangtse beyond the gorges of its middle course. On his return he proceeded northwards as far as Peking, his furthest point. The results of all these years of leisurely travel were published in 1873 in four handsome folio volumes containing an extensive collection of high-class photographs of landscapes, cities, buildings, and people, with accompanying text, which are still a treasury for those seeking information on the regions covered. Two volumes had been devoted to the 'Antiquities of Cambodia' in 1867. In 1875 he published a general narrative of his travels under the title of 'The Straits of Malacca, Indo-China, and China: Ten Years' Travels, Adventures, and Residence in the Far East.' In 1878, when England had just taken over Cyprus, Thomson visited the island with his camera, and in 1879 published the results—illustrations and text in two quarto volumes. For many years, in connection with the scheme for the instruction of travellers at the Society, Thomson acted as instructor in photography, his own experience as a traveller no doubt contributing largely to the success which he achieved.

J. S. K.

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ABBREVIATIONS, ETC.

Ar.	Arabic.	Jap.	Japanese.
Arm.	Armenian.	Lat.	Latin.
Bulg.	Bulgarian.	lat.	latitude.
Chin.	Chinese.	mt.	mountain.
colloq.	colloquially.	N.T.	New Testament.
conv.	conventional.	off.	official.
dist.	district.	O.T.	Old Testament.
Fed.	Federated.	pen.	peninsula.
form.	formerly.	Pers.	Persian.
Fr.	French.	Port.	Portuguese.
Geor.	Georgian.	pr.	pronounced.
Ger.	German.	prop.	properly.
Gr.	Greek.	riv.	river.
Heb.	Hebrew.	Russ.	Russian.
isld.	island.	Sp.	Spanish.
Ital.	Italian.	Turk.	Turkish.

Chinese and Japanese characters are printed from left to right.

The mark – shown over some of the long vowels in Arabic and Persian is optional; but the inverted comma ‘ representing the Arabic letter ع is essential. The apostrophe ’ indicates a liquid sound.

The pronunciations are in accordance with the R.G.S. II. System, for which see *Geog. Jour.*, Jan. 1921, Vol. LVII, pp. 40–43; or an explanatory leaflet can be had on application to the Royal Geographical Society.

The acute accent ′ indicates the stress: *a*, *e*, *u* = the neutral vowel as in *marine*, *often*, *difficult*.

Abadan: pr. Abadān: isld., Shatt al ‘Arab, Persia; Pers. ابادان; Ar. جزيرة الخضر = Jezīret el Khidhr; (not ‘Abbādān).

Achin: pr. Achín: dist. Sumatra; conv. for Malay اچيه = Acheh; Dutch Atjeh; (not Acheen).

Adana: pr. Ādănă: Turkey, Asia Minor; Turk. آطنه; Gr. Ἄδανα.

Afiun Qarahisar: Turkey, Asia Minor; Turk. افيون قره‌حصار or قره‌حصار صاحب = Qarahisar Sahib; (not Afium Karahisar, Afiun Karahissar, Kara Hissar Sahib).

Aleppo: Syria; conv. (Ital.) for Ar. حلب = Haleb; Fr. Alep.

Alexandretta: Syria; conv. for Turk. اسكندرون = Iskenderūn; Fr. Alexandrette; Ital. Alessandretta; (not Iskanderun, Iskenderoun).

Amanus: mts., Syria; conv. (Lat.) for Turk. الما طاغ = Alma Dagh, or گاور طاغ = Gavur (conv. Giaour) Dagh.

Amoy: China; conv. for Chin. 厦門 = Hsiamen.

Angora: pr. Ángŏrà: Turkey, Asia Minor; conv. for Turk. آنقره = Anqora; Gr. Ἄγκυρα = Ankyra, pr. Ángkĭra; (not Enguri).

Antioch: Syria; conv. for Ar. انطاكية = Antākīya; Fr. Antioche; Gr. Ἀντιόχεια = Antiokheia; Lat. and Ger. Antiochia; (not Antakieh).

'Aqaba: pr. Áqăbă: Arabia; Ar. عقبة, prop. قلعة العقبة = Qal'at el 'Aqaba; (not Akaba, 'Aqabah).

Ararat: mt., Armenia; conv. (and Russ. Араратъ) for Arm. Մասիս = Masis; Turk. اغرى طاغ = Aghri Dagh; Pers. کوه نوه = Kuh-i-Nuh.

Araxes: riv.; conv. (Lat.) for Russ. Араксъ = Araks; Pers. ارس = Aras; Arm. Երասխ = Yeraskh.

Ardebīl: Persia; اردبيل; (not Ardabil).

'Ashqabad: Transcaspia; Pers. عشق آباد prop. = 'Eshq Ābād; Russ. Асхабадъ = Askhabad; (not Askabad).

Asterabad: Persia; Pers. استر آباد, prop. = Ester Ābād; (not Astarabad, Astrabad).

Azerbāijan: pr. bā-ī (not bai); Pers. اذربايجان; (not Azerbaidjan, Azarbaijan, Aserbeidjan, Azerbijan).

Bahrein: isld., Persian Gulf, Arabia; Ar. بحرين; (not Bahrain, Awal).

Balkhash: lake, Siberia; Russ. Балхашъ; Turki بالقاش = Balqash; (not Balkash).

Baluchistan: Pers. بلوچستان; (not Beloochistan, Beluchistan, Biluchistan).

Bandar 'Abbās: Persia; Pers. بندر عبّاس; (not Bunder Abbas, Bender-Abas, Bender-Abassi, Gombroon).

Bangkok: Siam; Siam. ขาจกอก or กรุงเทพฯ = Krung Dhebh; (not Bankok).

Banjermasin: Borneo; Malay بنجرماسين; Dutch Bandjermasin; (not Banjermassin, Banyermassing).

Banyuwangi: Java; Malay باپووانڭى; Dutch, Banjoewangi; (not Banjuwangi, Banyuvangi).

Barfrūsh: Persia; Pers. بارفروش; (not Barfarush, Barferush, Barfurush, Barforouche, Balfrush).

Batum: Georgia; conv. (Russ. Батумъ) for Geor. ბათუმი = Batumi, pr. Bátumi; Fr. Batoum.

Beirūt: Syria; Ar. بيروت; Fr. Beyrout or Beyrouth; (not Bairut, Beirout).

Benkulen: Sumatra; conv. for Malay بغكولو = Bangka-ulu; Dutch Benkoelen; (not Bencoolen).

Beyshehr: Turkey, Asia Minor; conv. for Turk. بگشهر = Begshehr; (not Beishehr, Bey Shehir, Bey Schehr).

Blagovyeshchensk: Siberia; Russ. Благовѣщенскъ; (not Blagovestchensk).

Borazjan: colloq. pr. Borazjun: Persia; Pers. برازجان; (not Borazdjun).

Bosporus; conv. (Lat.) for Turk. بوغاز ایچی = Boghaz Ichi, pr. Boaz; Gr. Βόσπορος = Vosporos; Bulg. and Russ. Босфоръ = Bosfor; Fr. Bosphore; Ital. Bosforo; (not Bosphorus).

Brusa: Turkey, Asia Minor; Turk. بروسه; Gr. Προῦσα = Prousa; Fr. Brousse; (not Brussa, Broussa, Boursa).

Bukhāra: Pers. بخارا, Russ. Бухара; (not Bokhara, Bochara, Buchara, Boukhara).

Bushire: pr. Būshīr: Persia; conv. for Pers. بندر ابو شهر = Bandar Abu Shehr, or Bushehr; (not Abu Shahr).

Canton: China; conv. for Chin. 廣 州 府 = Kwangchowfu; (not Kuang-chou, Kwang-chau).

Caucasus: mts.; conv. (Lat.) for Russ. Кавказъ = Kavkaz, pr. Kafkas; Geor. კავკასიონი = Kavkasioni; Fr. Caucase; Ger. Kaukasus.

Celébes: pr. Selébes: Dutch East Indies; conv. (origin uncertain).

Chefoo: China; conv. for Chin. 芝 罘 = Chihfu, or 烟 台 = Yentai; (not Chifu).

Chemulpho: pr. Che mul p-ho: Korea; Korean 濟 物 浦 = Chyöimulpho, or 仁 川 = Inchhyön, Jap. Jinsen; (not Chemulpo).

Chilachap: pr. Chiláchap: Java; Malay چلاچڤ; Dutch Tjilatjap; (not Tjelatjap, Chilatjap).

Cyprus: conv. (Lat.) for Gr. Κύπρος = Kypros; Fr. Chypre; Ger. Cypern; Ital. Cipro; Turk. قبرص = Qibris.

Dairen: Kwantung Leased Territory; Jap. and Chin. 大 連 = Ta-lien (Chin.); Russ. Дальній = Dal'ni; (not Dalny).

Damascus: Syria; conv. (Lat.) for Ar. دمشق = Damashq, or الشام = Esh Shām; Fr. Damas, or Cham Chérif; Ital. Damasco; Ger. Damaskus.

Dardanelles; conv. (and Fr.); Turk. بوغازلر = Boghazlar, pr. Boazlar, or (narrowest part) چناق قلعة = Chanaq Qal'e; Gr. Ἑλλήσποντος = Ellēspontos, or Δαρδανέλλια = Dardanellia; Ital. Dardanelli; Ger. Dardanellen; Russ. Дарданеллы = Dardanelli.

Demavend: mt., Persia; Pers. دماوند; (not Damavand).

Diarbekr: Turkey, Asia Minor; Turk. دیاربکر, or قره آمد = Qara Āmid; Arm. Տիգրանակերտ = Dikranakerd; (not Diarbekir).

Doha: Qatar, Arabia; Ar: دوحه; form. بدع = Bida'; (not Dohah, Al Bida).

Dunbeni: pr. Dumbeni; Persia; Pers. دنبنی; (not Dumbineh, Dumbeneh, Dumbina).

Edremid: Turkey, Asia Minor; Turk. ادرمید; Gr. Ἀδραμύττιον = Adramyttion, pr. Adhramiti(on); (not Adramid, Edremit, Adramyti).

Ejmiadzin: Armenia; Arm. Էջմիածին; Russ. Эчміадзинъ = Echmiadzin; (not Etchmiadzin, Edgmiatsin, Itsmiadsin, nor Vagharshabad).

Elburz: mts., Persia; Pers. البرز, prop. pr. Alborz; (not Elbruz).

Enzeli: pr. *Énzelī*: Persia; Pers. انزلی, Russ. Энзели; (not Enzali).

Erzerūm: Armenia; conv. (Turk. ارضروم) for Arm. Կարին = Karin; (not Erzeroum, Arzerum).

Erzinjan: Armenia; conv. (Turk. ارزنجان) for Arm. Երզնկա = Yerznka, pr. Yerzenka; (not Erzingan, Erzingjan, Erzindjan).

Famagusta: Cyprus; conv. for Turk. فاماغوستا = Famaghusta; Gr. Ἀμμόχοστος = Amnokhostos.

Farasān: pr. Farasán or Farsán: islands, Red Sea, Arabia; Ar. فرسان; (not Farsan, Farisan).

Foochow: pr. Fuchow: China; conv. for Chin. 福州 = Fuchow; (not Fu-chau).

Formosa: Japanese Empire; conv. (Port.) for Chin. and Jap. 臺灣 = Taiwan.

Haiphong: pr. Haifong; Tongking; conv. (and Fr.) for Chin. 海防 = Haifang.

Harbin: Manchuria; conv.; Chin. 哈爾濱 = Haerhpin; Russ. Харбинъ = Kharbin.

Hejaz: prop. pr. Hizhāz, colloq. Hezhaz: Arabia; Ar. حجاز; (not Hijaz, Hedjaz).

Hodeida: Yemen, Arabia; Ar. حديدة; (not Hodaidah, Hudeida).

Hokkaido: isld., Japan; Jap. 北海道; (not Hokkaida, Hokushu, Yezo, Ezo).

Honshu: isld., Japan; Jap. 本州; (not Honshiu, Hondo, Nippon).

Isfahān: Persia; Pers. اصفهان, pr. Esfahān; (not Ispahan, Esfahan).

Izmid: Turkey, Asia Minor; Turk. ازميد; Gr. Νικομήδεια = Nikomēdeia, pr. Nikomídhia; (not Ismid, Ismit).

Jask: Persia; Pers. جاسك; (not Jashk, Djask).

Jauf: Arabia; Ar. جوف, prop. جوف الامر = Jauf ul Amir, or جوف بن عامر = Jauf bin 'Amr; (not Jof, Djauf, El Jauf, Jauf al 'Umr).

Jidda: Arabia; Ar. جدّة; (not Jedda, Jeddah, Djeddah, Jiddah).

Kabul: pr. Kābūl: Afghanistan; Pers. كابل; (not Cabul, Cabool, Caubul).

Kandahar: Afghanistan; conv. for Pers. قندهار = Qandahār; (not Candahar).

Kazerūn: Persia; Pers. كازرون; (not Kazarun).

Kazvin: Persia; conv. for Pers. قزوين = Qazvin; (not Kazvine, Kazbin, Kasvin).

Keelung: Formosa; conv. for Chin. 雞籠 = Chilung, off. Jap. Kiirun; Jap. 基隆 = Kiryu; (not Kelung, Kilung).

Kermān: Persia; Pers. كرمان; (not Kirman).

Kermānshāh: Persia; Pers. كرمانشاه or more correctly كرمانشاهان = Kermānshāhān; (not Kirmanshah).

Khurasān: Persia; Pers. خراسان; (not Khorasan, Khorassan).

Khurramabad: Persia; Pers. خرّم‌آباد, prop. = Khurram Ābād; (not Khorramabad, Khoramabad).

Kiaochow: China; Chin. 膠州; Ger. Kiau-Tschou; (not Kiau Chau).

Kiresün: Asia Minor; Turk. كيرهسون; Arm. Կիրասուն = Kirasun; Gr. Κερασοῦς = Kerasous; (not Kerasunda, Kerasund, Kerasun).

Kirin: Manchuria; conv. for Chin. 吉林府 = Chilinfu; (not Kilinhsien).

Konia: Turkey, Asia Minor; conv. for Turk. قونيه = Qoniya; Gr. Ἰκόνιον = Ikonion; Lat. Iconium; (not Konieh).

Korea: conv. for Chin. 高麗 = Kaoli; Korean 朝鮮 = Chyosyön, Jap. Chosen; Fr. Corée; (not Corea).

Kwantung: = Jap. Leased Territory, Manchuria; Chin. 關東; Jap. 關東州 = Kantoshu; (not Kuantung, Kwantoshu).

Kyoto: Japan; Jap. 京都; (not Kioto).

Kyushu: isld., Japan; Jap. 九州; (not Kiusiu, Kiushiu).

Latakia: Syria; conv. for Ar. لاذقية = Lādhiqīya; Gr. Λαοδίκεια = Laodikeia, pr. Laodhíkia; (not Ladikiya, Latakieh, Lattakia, Latakiya).

Lingeh: pr. Lin-geh, prop. Lan-geh: Persia; Pers. لنگه; (not Linja).

Līth: Arabia; Ar. ليث; (not Laith).

Macassar: Celébes, Dutch East Indies; conv. for Malay مغكاسر = Mangkasar; Dutch Makasser; (not Makassar).

Maidān-i-Naftūn: oil-field, Persia; Pers. ميدان نفطون; (not Maidan-i-Naphtun).

Malacca: Straits Settlements; conv. for Malay ملاك = Malaka; Dutch Malaka.

Manila: Philippine Islands; (not Manilla).

Manjīl: Persia; Pers. منجيل; (not Mandjil, Manzil, Mendjil).

Marmara, Sea of; conv. for Turk. مرمره دكز = Mermere Deniz; Gr. Προποντίς = Propontis, or Θάλασσα Μάρμαρα = Thalassa Marmara; Bulg. (Russ.) Мраморно(е) море = Mramorno(e) more; (not Marmora).

Mazanderan: Persia; Pers. مازندران; (not Mazandaran).

Mecca: Arabia; conv. for Ar. مكّة = Makka; Fr. La Mecque; Ger. Mekka.

Medīna: Arabia; conv. for Ar. ال مدينه = El Medina; Fr. Medine; (not Madinah).

Meshed: Persia; conv. for Pers. مشهد = Mash-had; (not Mashad).

Mianeh: Persia; conv. for Pers. ميانج = Mīyānej; (not Miane, Mianah, Miannedj).

Mocha: pr. Mokha: Yemen, Arabia; conv. for Ar. مُخا = Mukha; (not Makha, Mokha).

Mohammerah: prop. pr. Mohammareh: Persia; Pers. محمّره; (not Muhammara, Muhammera, Muhammareh, Muhammerah).

Mormugão: pr. Mormugan (-an very nasal): Goa, Port. India; (not Marmagao, Marmagoa).

Moukden: Manchuria; conv. (Fr.) for Chin. 奉天府 = Fengtienfu; Russ. Мукденъ = Mukden'.

Muroran: Hokkaido, Japan; Jap. 室蘭; (not Mororan).
Muscat: Arabia; conv. for Ar. مسقط = Masqat; (not Maskat).
Nanking: China; conv. for Chin. 南京 = Nanching; Russ. Нанкинъ = Nankin; (not Nankeen).
Nehavend: Persia; Pers. نهاوند; (not Nihavand, Nehavand).
Nejd: pr. Nezhd or Neid: Central Arabia; Ar. نجد; (not Najd, Nedjed).
Nikpei: Persia; Pers. نيكپي; (not Nikpai, Nikbeg, Nikisi, Niked).
Ob': pr. Op': riv., Siberia; Russ. Обь; (not Obi).
'Oqair: sometimes pr. 'Ojair: Arabia; Ar. عقير; (not Ojair, Okair, Uqair).
Oxus: riv.; conv. (Lat.) for Pers. امو دريا, Russ. Аму Дарья = Amū Daryā, or جيحون = Jaihūn; (not Amu Daria).
Palmyra: Syria; conv. (Lat.) for Ar. تدمر = Tadmur; Fr. Palmyre; (not Tadmor, Tudmur).
Panarukan: Java; Malay ڤنروكن; Dutch Panaroekan.
Pasuruan: Java; Malay ڤسوروان; Dutch Pasoeroean; (not Pasaroeang, Passoeroean).
Peking: China; conv. for Chin. 北京 = Peiching; Russ. Пекинъ = Pekin; Fr. Pékin; (not Pekin).
Penang: Straits Settlements; conv. for Malay ڤولو ڤينڠ = Pulau Pinang.
Perak: pr. Pēra: Fed. Malay States; conv. for Malay ڤيرق = Peraq (the last letter being mute and like Ar. *hamza*, which indicates an abrupt cutting off of the breath).
Philippine Islands: -ine pr. as in *ravine*, not as in *mine*; Sp. Islas Filipinas.
Pondicherry: French India; conv. for Fr. Pondichéry; (not Pondicherri, Pondichéri).
Port Arthur: Kwantung Leased Territory; conv. (Russ. Портъ Артуръ) for Chin. 旅順 = Lushun, Jap. Ryojun.
Probolinggo: Java; Malay ڤربلغڠ; (not Probolingo).
Qasr-i-Shirīn: Persia; Pers. قصر شيرين; (not Kasr-i-Shirin).
Qatar: sometimes pr. Gatar: pen. Arabia; Ar. قطر; (not El Qatar, Qatr, Katar, Katr, Bar al Katr, Gattar).
Quelpart: pr. Kwelpart: isld., Japan; conv. (orig. Dutch Quelpaert) for Korean 濟州島 = Chyöijyudo, Jap. Saishuto.
Qum: Persia; Pers. قم; (not Kum, Koum, Ghoum).
Resht: Persia; Pers. رشت, Russ. Решть; Fr. Recht; (not Rasht).
Rhodes: isld.; conv. for Greek Ῥόδος = Rodos, pr. Ródhos; Turk. ردوس = Redos; Ital. Rodi.
Riyādh: Nejd, Arabia; Ar. رياض; (not Riadh, Riad).
Sakhalin: pr. Sakhālīn; Russ. Сахалинъ; Jap. 樺太 = Karafuto (this name to be used S. of lat. 50°); (not Saghalien, Saghalin).
Salayar: Dutch East Indies; Malay سلاير; Dutch Saleier; (not Saleyer, Salajar, Saleijer).
San'ā: Yemen, Arabia; Ar. صنعا; (not Sana'a, San'ah, Sanaa, Sana).
Saqqiz: Persia; Pers. سقّز; (not Saqqez, Sakiz).

Sarawak: pr. Saráwa; conv. for Malay سراوق = Sarāwaq; (see Perak).

Sehneh: Persia; Pers. سحنه or سنندج = Sinandij; (not Sinneh, Sinna, Senna, Sihna, Sehna).

Seistan: pr. Sīstan: Persia; Pers. سیستان.

Semarang: Java; Malay سمارغ, pr. Semárang; (not Samarang).

Seoul: Korea; conv. for Korean Syŏul; Chin. 漢城 = Hancheng; Fr. Séoul; Ger. Söul; Jap. 京城 = Keijo.

Serang: Dutch East Indies; Malay سیرغ; Dutch Ceram; (not Seran).

Shushtar: Persia; Pers. شوشتر; (not Shustar).

Sidon: Syria; conv. for Heb. צִידוֹן = Zidon; Ar. صیدا = Saida.

Singapore: Straits Settlements; conv. for Malay سیغاپورا = Singapura.

Smyrna: Asia Minor; conv. (Lat.) for Gr. Σμύρνη = Smyrnē, pr. Smirni; Fr. Smyrne; Turk. ازمیر = Izmir.

Soochow: China; conv. for Chin. 蘇州府 = Suchowfu; (not Suchau).

Sumbawa: Dutch East Indies; Malay سمباوا; Dutch Soembawa.

Surabaya: Java; Malay سوربای; Dutch Soerabaja; (not Sourabaya, Soerabaya).

Swatow: China; conv. for Chin. 汕頭 = Shantow; (not Shantau).

Tabrīz: Persia; Pers. تبریز; (not Tabreez, Tebriz).

Takow: Formosa; Chin. and Jap. 打狗; (not Takao, Takau).

Taurus: mts., Asia Minor; conv. (Lat.) for Turk. بلغار طاغ = Bulghar Dagh (S.W. portion) and آلا طاغ = Ala Dagh (N.E. portion).

Tehrān: Persia; Pers. طهران; Fr. Téhéran; Russ. Тегеранъ = Teheran; (not Teheran).

Tiflis: Georgia; conv. (Russ. Тифлисъ) for Geor. თფილისი = Tpilisi, pr. Tpílisi.

Tokyo: Japan; Jap. 東京; (not Tokio).

Tongking: French Indo-China; conv. for Chin. 東京 = Tungking; Fr. Tonkin.

Trebizond: Asia Minor; conv. for Turk. طربزون = Tirabzon; Russ. Трапезундъ = Trapezund; Fr. Trébizonde; Gr. Τραπεζοῦς = Trapezous; Arm. Պոնտոս = Bondos (from Gr. Πόντος = Pontos).

Tripoli: Syria; conv. (Ital.) for Ar. طرابلس شام = Tarābŭlŭs Shām; Gr. Τρίπολις = Tripolis; Fr. Tripoli de Syrie or Tarablous Cham.

Tsingtao: China; Chin. 青島, Jap. Seito; Ger. Tsingtau; (not Chingtao, Tsingtau).

Turkistan: Pers. ترکستان (pr. in Pers. Torkestan); Russ. Туркестанъ = Turkestan.

Tyre: Syria; conv. for Ar. صور = Sūr; Heb. צוֹר = Zor; Fr. Tyr; Ger. (Lat.) Tyrus.

Urmia: pr. Úrmia (Arm.), Urúmieh (Pers.): town and lake, Persia; conv. (Arm. Ուրմիա) for Pers. ارومیة = Urūmīyeh; Turk. رومیه = Rumiya; (not Urim, Urumia, Ourmi, Ourmiah).

Vasht: Persia; Pers. واشت; (not Kwash, Kvash).
Vladivostok: pr. Vladivastók: Siberia; Russ. Владивостокъ; (not Vladivostock).
Wejh: Arabia; Ar. وَجه; (not Wajj, Wejj, Wej, Wajh).
Yemen: Arabia; Ar. يَمَن; (not Yaman).
Yenbo': Arabia; Ar. ينبع; (not Yanbo, Yambo, Yenboughl bahr).
Yezd: Persia; Pers. يزد; (not Yazd, Yesd).
Zamboanga: Philippine Islands; (not Samboanga).
Zenjān: Persia; Pers. زنجان, prop. pr. Zănjān; (not Zinjan, Zindjan).
Zuhāb: Persia; Pers. زهاب; (not Zohab).

Lists of Names in Palestine and Mesopotamia will be published later after reference to local authorities.

FIRST GENERAL LIST OF EUROPEAN NAMES.

CORRIGENDA.

p. 3. *For* **Brasov** *read* **Braşov.**

p. 4. **Candia**: *after* Khandaq *insert* , Gr. Χάνδαξ = Khandax.

p. 5. **Dniester**: *for* Rum. and Pol. Dniestr *read* Rum Nistru; Pol. Dniestr.

p. 6. **Frankfurt** (on the Oder): *for* am Oder *read* am (prop. an der) Oder.

p. 8. *For* **Nikolaistad**, *etc., read as follows:—*
Vaasa: Finland; form. Nikolainkaupunki; Swed. Vasa, form. Nikolaistad; (not Wasa).

p. 11. *For* **Sighisoara** *read* **Sighişoara**: pr. Sigishára.
For **Temisoara** *read* **Temişoara**: pr. Temishára.

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